

# Abstracts from the 5th World Congress on Vascular Access WoCoVA 2018 June 20–22, 2018, Copenhagen, Denmark

The Journal of Vascular Access  
1–85  
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DOI: 10.1177/1129729818778929  
journals.sagepub.com/home/jva  


## Oral sessions

### Session 1: Minimizing the risk of thrombosis

#### O-01

#### Brazilian experience 2017: PICC-related thrombosis

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The peripherally inserted central catheter became widespread. This device has a lot of advantages, because it is associated with low risk of complications in patients with coagulation disorders or at high risk of infection or anatomical difficulties. Currently, in Brazil, PICC is a safe alternative when patients require this device.

We retrospectively reviewed the use of valved and non-valved PICC during the period of four years focusing on low rate adverse events and complications associated with this device maintenance and high successful insertions. Nowadays the vascular access nurse team placed only polyurethane non-valved PICC line with ultrasound-guided Seldinger's technique, without x-ray, navigation and also electrocardiogram interpretation.

From January to December, 2017 we placed 2480 PICC lines, the success rate of vascular access nurse team was 99.6% to 97.2%. In October 2016 we started using EKG guided PICC placement.

This study was performed from January to December, 2017 in a private hospital with focus on cardiology and oncology located in São Paulo, Brazil. During this period, a total of 2480 catheters was placed, with EKG tip confirmation, or when was not possible to perform the EKG tip confirmation because they had arrhythmias in other hand we used the navigation technologie.

The success rate was 2419 catheters and the ultrasound is requested when there is symptomatology such as edema, pain in the axillary region or reduction of perfusion of the upper limbs. The rate PICC-related thrombosis was 40 (1,65%) confirmed by ultrasound. In conclusion, in our hospital the PICC-related thrombosis is not associated with high risk and the result is better when there is a team in trained and use of technology.

#### O-02

#### Reducing catheter-related thrombosis using a risk reduction tool centered on catheter to vessel ratio

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In vascular access practices, the internal vessel size is considered important, and a catheter to vessel ratio (CVR) is recommended to assist clinicians in selecting the most appropriate-sized device for the vessel. In 2016, new practice recommendations stated that the CVR can increase from 33 to 45% of the vessels diameter. There has been evidence on larger diameter catheters and increased thrombosis risk in recent literature, while insufficient information established on what relationship to vessel size is appropriate for any intra-vascular device.

Earlier references to clinical standards and guidelines did not clearly address vessel size in relation to the area consumed or external catheter diameter. The aim of this manuscript is to present catheter-related thrombosis evidence and develop a standardized process of ultrasound-guided vessel assessment, integrating CVR, Virchow's triad phenomenon and vessel health and preservation strategies, empowering an evidence-based approach to device placement.

Through review, calculation and assessment on the areas of the 33 and 45% rule, a preliminary clinical tool was developed to assist clinicians make cognizant decisions when placing intravascular devices relating to target vessel size, focusing on potential reduction in catheter-related thrombosis. Increasing the understanding and utilization of CVRs will lead to a safer, more consistent approach to device placement, with potential thrombosis reduction strategies.

The future of evidence-based data relies on the clinician to capture accurate vessel measurements and device-related outcomes. This will lead to a more dependable data pool, driving the relationship of catheter-related thrombosis and vascular assessment.

## Session 2: The newborn

### O-03

#### Exploring the use of extended dwell peripheral intravenous catheters in the newborn intensive care

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In order to deliver life sustaining nutrition and medications, neonatal nurses ensure vascular access in hospitalized newborns using both peripheral intravenous (PIV) catheters for short term access and central venous (CVC) catheters for longer-term nutrition and medication administration. The veins of this population are tiny and delicate and sometimes require multiple attempts to establish access. PIV's have short dwell times due to infiltration, dislodgment, occlusion or leakage. CVC placement carries an increased risk of central line associated blood stream infection. (CLABSI). Frequent, multiple sticks in neonates are not without adverse long term neurological, growth and development consequences. Our purpose is to evaluate the use and viability of extended dwell peripheral intravenous (EPIV) catheters in place of the PIV or CVC when indicated in a target population. The goal is to reduce the number of traumatic sticks an infant experiences and possibly reduce the potential of a CLABSI if an EPIV could be used in its place. EPIV's have a dwell time of 29 days. Our project is to place EPIV's in neonates we have identified as candidates and evaluate the influence EPIV's have in reducing the number of sticks, PIV's and CVC's an infant requires for treatment, thereby reducing the overall number of painful procedures and potentially a CLABSI. We expect our results will show that placement of an EPIV, when indicated, will reduce the number of PIV's or CVC's a targeted group of infants would require by 50%. The use of EPIV's in the NICU have great potential in reducing the number of sticks an infant experiences, prevents interruptions in therapy, and improves the neurological growth and development impact. EPIV placement in the NICU population is a simple, safe, and cost effective alternative for infants that need reliable peripheral access for longer than three days of therapy.

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### O-04

#### The optimal electrocardiogram P/R amplitude ratio of intracavitary electrocardiogram (IC-ECG) method for positioning the tip of PICC in neonates: results of a cohort study

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**Introduction:** Performing the effect of the intracavitary electrocardiogram (IC-ECG) location method and investigating the optimal electrocardiogram P/R amplitude ratio (P/R) when using IC-ECG location method in neonates.

**Method:** A retrospective study between November 2015–December 2017 in a university-affiliation hospital. All neonates who inserted PICC with IC-ECG location method were enrolled. Record P/R during catheterization and PICC tip position. Analyze the validity of P/R 50–80% to confirm PICC's tip position arrival in an ideal place. The sensitivity (SEN) and specificity (SPE) of each P/R were calculated by receiver operating characteristic curve (ROC). The corresponding value of the maximum cut-off point of Youden index (SEN + SPE-1) is the optimum P/R for determining the tip arrival in ideal place when using IC-ECG positioning method.

**Results:** In total, 202 neonates were enrolled. Tip position: lower 1/3 SVC or CAJ: 119 (58.9%), middle and upper 1/3 SVC: 30 (14.9%), beyond SVC: 8 (4.0%), right atrium or right ventricle: 44 (21.8%), heterotopia: 1 (0.5%). The P/R 50-80% has a SEN of 99.2%, SPE of 24.4%, the positive predictive value of 65.7% and negative predictive value of 95.3% in predicted tip position in ideal place. According to the ROC curve, the indication of ideal PICC tip position is the P/R 52.5% (SE=0.856, SP=0.767)~62.5% (SEN=0.791, SPE=0.907) in neonates who used IC-ECG localization method.

**Conclusion:** P/R 50~80% have a lower efficiency to predict the tip position in an ideal place while a higher efficiency in confirm the tip position in an unsatisfactory place. 52.5–62.5% P/R can be more accurately and safely determine the PICC catheter tip to reach the optimal position.

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### Session 3: The patient in ICU

#### O-05

##### **A dedicated vascular access and infusion therapy team in an acute care hospital: The benefits of reducing central line-associated bloodstream infections**

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**Introduction:** Central Line-Associated Bloodstream Infection (CLABSI) is a major systemic complication related to infusion therapy, but most of the time evitable when evidence-based practices are followed by healthcare professionals during device insertion and maintenance. In this study, we evaluated the effect of the Vascular Access and Infusion Therapy Team (VAT) on the incidence of CLABSI in adults patients admitted to a hospital in Southern Brazil.

**Method:** The quasi-experimental study was conducted at the Santa Casa de Misericórdia de Porto Alegre, Brazil. The Pavilhão Pereira Filho Hospital (PPF), one of the hospital's complex, has 86 beds (14 beds of intensive care unit and 72 beds distributed in 01 intermediate care unit and 03 clinical/surgical units). The pre-intervention CLABSI rate of 8 months (January to August 2015) was compared with the 8-month intervention period (September 2015 to April 2016) and the post-intervention period of 8 months (May 2016 to December 2016). The activities developed by the VAT include: daily assessment of patients with centrally inserted central catheter (CICC), dressing changes of CICC, insertion of peripherally inserted central catheter (PICC), management of catheters occlusions, infusion therapy consulting, CLABSI management, introduction of new technologies and continuing education of health professionals, patients and families.

**Results:** During the pre-intervention period, the mean rate was 4.25 CLABSI per 1000 catheters-days, compared with 1.25 and 1.52 CLABSI per 1000 catheters-days in the intervention and post-intervention periods, respectively. A reduction of 71% in the mean rate of CLABSI occurred during the intervention period, and a reduction of 64% was observed after this period.

**Discussion & Conclusion:** Sustaining low CLABSI rates in our hospital is feasible with team engagement and ongoing collaboration. With these results, we further demonstrate the positive impact of the Vascular Access and Infusion Therapy Team in CLABSI reduction efforts.

#### O-06

##### **Arterial insertion method: A systematic and anatomical approach to arterial catheter insertion**

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**Introduction:** The Arterial Insertion Method (AIM) is intended to provide a clinical framework for radial artery catheter insertion to minimize mechanical complications associated with patient range of motion and areas of flexion. Arterial catheter placement commonly utilizes a palpation insertion technique. Ultrasound guidance now creates opportunity for greater device optimization. With the ability to consider blood flow dynamics, adjusting the insertion site location increases the reliability of hemodynamic monitoring parameters through better-quality flow, improved vessel size and device functionality.

**Method:** AIM is a systematic approach designed to aid in arterial catheter insertions by optimizing the clinical approach. This promotes identification of the ideal insertion zone (RED, YELLOW, GREEN areas) for peripheral arterial catheters with ultrasound guidance.

**Discussion:** AIM outlines the anatomical structure and segmented region of the radial artery to include depth, size and segmentation allowing a systematic approach to arterial catheter insertion. Non-ultrasound-guided or palpation techniques for arterial insertion are generally within the area of flexion (red zone) requiring use of an arm board to maintain catheter function. The AIM approach is designed to move the insertion site out of the range of motion or flexion region, into a segment with a larger artery (Green zone), increased arterial flow (Kim et al, 2015), and stable surface area.

**Conclusion:** The importance of this publication is to identify the insertion segment considerations as it relates to catheter function while maximizing device performance. The significance of a systematic approach is that it is reproducible, measurable, and as a result will reduce variation in catheter insertion practice. AIM combines known mechanisms for reducing arterial-related site complications with a systematic approach utilizing ultrasound guidance.

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## Session 4: The patient with a peripheral venous access

### O-07

#### An intervention to decrease short-term peripheral vascular catheter-related bacteraemia. The impact on incidence and mortality

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**Background:** Catheter-related bacteremia (CRB) is a patient safety problem and a preventable cause of death. While attention was focused on central venous catheter infections, peripheral venous catheters cause a significant number of peripheral venous catheter-related bacteremia (PVCRB) among hospitalized patients in our hospital.

**Aim:** to assess the effectiveness of a long-term multimodal preventive strategy applied sequentially from 2003 to 2016 to reduce PVCRB.

**Methods:** The intervention was based on continuous PVCRB surveillance, implementation of evidence-based preventive measures, educational campaigns targeted to front-line staff, scheduled replacement for PVC when placed in the emergency department and assessment of adherence to catheter care guidelines by ward rounds.

**Findings:** From January 2003 to December 2016, 227 episodes of PVCRB were identified in non-ICU patients. *Staphylococcus aureus* was responsible of 115 (50.7%) episodes. After program implementation, incidence decreased from 30 episodes (1.17 episodes/10,000 patients-days) in 2003 to 8 episodes (0.36 ep/10,000 pt-days) in 2016 (Chi-square test for trend,  $p < 0.05$ ). Episodes caused by *S.aureus* decreased from 18 episodes in 2003 (0.70 ep/10,000 pt-days) to 3 episodes in 2016 (0.14 ep/10,000 pt-day) ( $p < 0.002$ ) as well as mortality decrease from 7 cases in 2003 (0.27ep/10,000 pt days) to 0 cases in 2016 (0.00 ep/10,000 pt days) ( $p < 0.01$ ).

**Conclusions:** The implementation of a multimodal strategy and continuous assessment of performance conduced to a sustained reduction of PVCRB. This reduction had a major impact among *S.aureus* associated PVCRB rates and mortality.

### O-08

#### 'Phlebitis Zero': Working to reduce the complications associated with short peripheral intravenous catheter

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**Introduction:** 'Phlebitis Zero' - multicenter project, 45 hospitals - applies a bundle of preventive measures with scientific evidence IA/IB aiming at minimizing complications associated with short peripheral intravenous catheter (PIVC).

**Method:** The bundle's effectiveness was analyzed through a pilot study carried out in April 2015 (phase I, pre-bundle) and December 2015 (phase II, post-bundle). From 14<sup>th</sup>-28<sup>th</sup> February 2017 a prospective phlebitis incidence study was carried out (phase III). PIVC were monitored from insertion to removal with identical criteria in all hospitals. Health professionals received standardized on-line training regarding 5 steps to be implemented: s1) adequate selection of catheter (smallest possible); s2) hand hygiene; s3) skin disinfection with chlorhexidine 2% in 70% alcohol solutions; s4) aseptic maintenance of catheters: s4a) visible insert point (transparent dressings), s4b) disinfection of needleless-connectors, s4c) cleaning of catheters' inner surfaces with saline solutions at least every 24h, s4d) avoidance of phlebotoxic drugs; s5) removal of unnecessary PIVC.

**Results:** From phases I to III: 20,943 monitored PIVC, 22,616 maintenance and 7,500 trained nurses. Phlebitis cumulative incidence (Maddox scale) is 12.03%; the incidence density 37.98 episodes x 1,000 catheter-days. Comparison phase I-III: Achievements: s1) increased standard-caliber 22 Gauges selection- (35% to 45%); s3) use of 2% chlorhexidine-alcoholic (66% to 88%); s4a) visible insertion point (85% to 98%)  $p < 0.05$ . Areas for improvement: s2) hands hygiene not performed in 7.55% insertions; s4) 28% PIVC inserted in hand/wrist; 26.31% use 3-way-stopcocks; s4b) 32.16% missed opportunities for bio-connectors disinfection; s4d) more than 30 phlebotoxic drugs per PIVC; s5) 13.97% are unnecessary catheters.

**Discussion & Conclusion:** 'Phlebitis Zero' is a unique multicenter incidence study of complications (phlebitis). The overall cumulative incidence is 12%. Current phlebitis standard (5%) should be revised when supported by prevalence studies. It is necessary to improve the handling of devices and accessories, the administration of medication and the aseptic maintenance of catheters.

## Session 5: Minimizing occlusions: Flush & lock policies

### O-09

#### Prospective audit to study synerkinase use to restore patency in occluded central venous catheters in haematology and oncology patients – Interim results from a multicentre study

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**Introduction:** Patency of CVAD is essential in the treatment of haematology and oncology patients. CVAD occlusion often associated with thrombosis is defined as a) the inability to administer treatments due to a total occlusive (TO) or b) Persistent Withdrawal Occlusion (PWO) when there is failure to obtain blood return on aspiration. SynerKINASE (urokinase) is one of the most widely used thrombolytic agents, although there are several protocols for its use very few outcome studies have been published in the UK.

**Method:** A small multicentre focus group conducted a prospective audit of the management of occluded CVAD using standardised SynerKINASE dose algorithms from September 2017 to February 2018 (Prospective Audit to Study SynerKINASE use to restore Patency in Occluded Central Venous Catheters -PASSPORT study). Centres that use SynerKINASE in haematology and oncology units participated in the audit. Data was collected anonymously using a web based platform. SynerKINASE doses administered ranged between 5000IU – 25000IU, the high dose of 25000IU has not been used previously in these centres. Additional doses of SynerKINASE were administered if the first administration was unsuccessful.

**Results:** n=117, 54 females (46%) and 63 males (54%), median age was 60 (46-68). From the first thrombolytic treatment with SynerKINASE, out of 53 CVAD with TO, patency was restored in 46 (87%) and out of 64 CVAD with POW patency was restored in 80%. The CVAD clearance rate was dose dependent, patency was restored in 82% of CVAD with 5000IU, 100% of CVAD with 10000IU and 90% of CVAD with the high dose of 25000IU. No adverse events were recorded in this audit.

**Discussion/Conclusion:** In this prospective audit treatment of occluded CVAD using standardised SynerKINASE dose regimens was safe and effective in restoring patency of CVAD. Further analysis from this study will be carried out as longer follow up data is obtained.

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## O-10

### Impact of saline flushing volume on PIVC failure, vascular calibre and tissue injury – A pre-clinical human trial

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**Introduction:** The insertion and maintenance of peripheral intravenous venous catheters (PIVCs) is associated with a failure rate ~40-60% before completion of prescribed treatment. Patient, practice and environmental factors influence PIVC failure; however, our understanding of determinants affecting PIVC failure remains largely experiential.

**Methods:** We developed a human, pre-clinical model of bilateral cephalic vein cannulation to study the impact of varying flushing volume over 5 hours on device failure and vascular structure/function. Both catheters were flushed hourly, however, the flushing volume differed; using either 3mL or 10mL, depending on the catheter. B-mode ultrasound was used to assess vascular calibre and thrombus formation. Flow cytometry and biochemistry assays assessed markers of platelet function/coagulation, throughout the period of cannulation.

**Results:** Out of 30 catheters placed in 15 participants, 2 catheters failed over the 5 hour period. 0 (0%) catheters failed in the 10mL flushing condition versus 2 (13.33%) in the 3 mL flushing condition ( $P < 0.001$  McNemar's test). Venous diameters were assessed demonstrating significant time and condition effects ( $P < 0.05$ ). Within the 10 mL condition, diameter decreased 12.8% (0H  $0.28 \pm 0.10$ , 5H  $0.25 \pm 0.07$  cm), whereas in the 3 mL condition diameter decreased 21.5% (0H  $0.25 \pm 0.08$ , 5H  $0.20 \pm 0.08$  cm). However, the effect of flushing volume did not change over time ( $P > 0.05$ ). Tissue factor concentrations in blood aspirated from the catheters demonstrated similar non-significant decreases over time (10mL 0H  $30.7 \pm 17.5$ , 5H  $27.4 \pm 14.7$ ; 3mL 0H  $29.0 \pm 14.7$ , 5H  $27.2 \pm 15.8$  pg/mL;  $P > 0.05$ ).

**Discussion and Conclusion:** Hourly flushing of catheters with 3 mL versus 10 mL saline may be associated with increased failure over 5 hours. Furthermore, insertion and maintenance of PIVCs is associated with progressive venoconstriction, which might impact upon device patency. Tissue factor concentrations remained unchanged over time and between flushing conditions, suggesting that tissue injury may not be the causative factor implicated in failure observed in this study.

## Session 6: Indications and advantages of tunneling

### O-11

#### The taurolidine-citrate-heparin catheter lock reduces catheter-related bloodstream infections in patients receiving home parenteral nutrition through a long-term tunnelled central venous catheter: A randomised and placebo-controlled trial

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**Introduction:** Patients with chronic intestinal failure are life-dependent on the provision of home parenteral nutrition (HPN). The continuous presence of a tunneled central venous catheter (tCVC) inflict a constant risk of developing catheter-related bloodstream infections (CRBSIs) leading to increased morbidity and high cost [1, 2]. This study investigates efficacy and safety of the antimicrobial catheter lock solution (CLS), taurolidine-citrate-heparin, compared to heparin 100 IE/mL on CRBSI prevention.

**Methods:** Forty-one HPN patients were randomized in a double-blinded, placebo-controlled trial. External, stratified randomization was performed according to age, gender and prior CRBSI incidence. The prior CRBSI rate was 2.4 episodes/1000 days (95% Poisson CL; 2.12-2.71). The maximum treatment period was two years or until occurrence of a CRBSI or right-censoring because of tCVC removal. Exact permutation-tests were used to calculate p-values for the log-rank tests.

**Results:** Twenty patients received the taurolidine CLS and 21 heparin CLS, with 9622 and 6956 treatment days, respectively. Zero CRBSIs occurred in the taurolidine arm versus 7 in the heparin arm with a rate of 1.0 /1000 days (0.4-2.07) ( $P=0.005$ ). The tCVC removal rates were 0.52 (0.17-1.21) and 1.72 (0.89- 3.0) in the taurolidine and heparin arm, respectively, tending to prolong tCVC survival in the taurolidine arm ( $P=0.06$ ). No difference in mechanical tCVC complications was observed ( $P = 0.4$ ). The taurolidine CLS was associated with mild and tolerable side-effects ( $n = 13$ ). The costs per treatment year were lower in the taurolidine arm (2348 €) versus the heparin arm (6744 €) due to fewer admission days related to treatment of tCVC-related complications ( $P=0.02$ ).

**Discussion & Conclusion:** In patients receiving HPN the taurolidine-citrate-heparin CLS demonstrates a clinically significant and cost-beneficial reduction of CRBSI occurrence compared to heparin. Taurolidine-containing CLS should be considered in *high risk* patients on long-term HPN with a tCVC.

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## O-12

### Complication rates among tunneled non-cuffed PICC and CICC in pediatric malignancies

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**Introduction:** A long-term venous access is essential in children when treating malignant diseases. Peripherally inserted central catheters (PICCs) have been shown to be a valuable alternative to traditional devices to provide central access for this patients specially those who are on induction chemotherapy. This study proposes to assess complication rates of tunneled peripherally (PICC) and centrally (CICC) inserted central venous catheters in a pediatric oncology population.

**Methods:** Retrospective cohort study and chart review of all pediatric oncology patients who underwent tunneled noncuffed peripherally (PICC) or centrally (CICC) inserted central venous catheters by the Pediatric Surgery Department at our institution from March 2016 through December 2017. Were reviewed demographic features, primary diagnosis, catheter days, reason for removal and cumulative incidence of line insertion-related complications were compared between PICC and CICC groups.

**Results:** Eighty-four tunneled catheters were inserted into 74 children (47 boys, 62 hematologic malignancies) during the 21-month period. Median catheter life was 70 days, with a total of 6919 catheter days. In the PICC group, age varied between 4 to 19 years (median 12 years), weight between 16 to 104 kilograms (median 43 kilograms), compared to CICC-group with ages varying between 2 months to 14 years (median 4 years) and weight from 4 to 48 kilograms (median 20 kilograms), showing statistic significance between groups ( $p$ -value 0,0001). The common reasons for catheter removal were suspected infection (9 PICC vs 9 CICC), occlusion (7 PICC vs 3 CICC), dislodgement (2 PICC vs 2 CICC) and death (3 PICC vs 7 CICC). None of complications showed statistic significance between groups.

**Conclusion:** Use of PICC or CICC lines are feasible and provides reliable long-term intra-venous access in children suffering from malignancies. Tunneled catheters are a good alternative to children with poor venous access in need of prolonged therapy.

## Session 7: Minimizing dislodgement

### O-13

#### PICC migration – a problem of the past: Cross-sectional and health-economic comparison of Adhesive and Subcutaneous Engineered Stabilization Devices for Securing PICCs

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**Introduction:** The number of patients requiring central venous access continues to increase as the management of Oncology and Haematology advances and life expectancy is prolonged. The combination of venous access and Systemic Anti-Cancer Therapy (SACT) results in a large population of patients who have varying levels of care and complications related to venous access. Infusional Services introduced the

Subcutaneous engineered stabilisation device (ESD) as an alternative PICC stabilisation device with a goal to reduce dislodgement and catheter movement associated complications.

**Method:** A cross-sectional analysis comparing all PICCs placed in 2013 were compared to the post-intervention period beginning 2015. The Subcutaneous ESD was introduced in June of 2014 allowing 6 months of learning curve before data collection resumed. All patients were monitored for migration and dislodgement using a PICC History Sheet and an electronic patient database.

**Results:** In 2013, there were 1111 PICCs placed. During this period 66 PICCs had migrated that resulted in catheter replacement, calculated as a 6% re-insertion rate.

In 2015, 1139 PICCs were placed with no migrations or replacements, 0% dislodgement and re-insertion rate. There were no statistically relevant differences between the patients in the two groups based on diagnosis, sex, age or placement of catheter.

**Discussion & Conclusion:** The introduction of Subcutaneous ESDs resulted in significant benefits for the patient, practitioner and Trust. It eliminated PICC migration and the need for PICC reinsertion. Subcutaneous ESDs have reduced delays to therapy and the potential for increased bed occupancy.

Subcutaneous ESDs offer a safe, effective, and economical alternative of PICC securement for patients who are not only unable to tolerate Adhesive ESDs, but also reduces risks for all PICCs such as migration, dislodgement and consequential thrombosis and infection. Additional prospective research is needed to assess the direct impact of Subcutaneous ESDs on PICC-associated infection, occlusion and thrombosis complications.

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## O-14

### Suture-less central venous fixation – The time is now

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**Introduction:** Guidelines discourage central line fixation using stitches and suture-less fixation is recommended (1). Failure to follow guidelines is seen in some nurses and physicians and is mostly due to fear of inadvertent catheter removal.

**Methods:** In this single center observational study we analyzed mode of central line securement and accidental catheter removal during one month.

**Results:** In December 2017 total of 36 central catheters were inserted. 4 were secured with sutures (Silkam, Braun, DE), one was accidentally removed during patient being moved from gurney to ICU bed (NS). All of the 32 suture-less secured lines (StatLock, Bard, USA and Grip-Lok, Vygon, FR) stayed *in situ*. No infection at the puncture site was present in both groups. In one patient redness at the suture site was noted (NS). No allergy to glue, difficulties with application and/or removal of suture-less devices was observed.

**Discussion:** Use of suture-less catheter fixing technique guarantees secure fixation with multiple advantages over suturing. Application is easy, securement is at least as good as with sutures. Accidental needle stick from stitching is avoided, patient discomfort is minimized, additional risk of catheter related blood stream infections is reduced.

**Conclusion** Using StatLock and Grip-Lok enables at least as good fixation as suturing the central line does. The use of suture-less securement should be encouraged by all health care professionals.

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## Session 8: The child and the venous access device

### O-15

#### Implementation of a difficult venous access (DIVA) pathway

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**Introduction:** Many patients are admitted to hospital with non-visible or palpable veins, often resulting in multiple painful attempts at cannulation, anxiety and catheter failure. We developed a difficult intravenous pathway to reduce the burden of difficult access for patients by increasing first attempt success with ultrasound guidance. The emphasis was to provide a solution for hospitalised patients after business hours by training the after-hours clinical support team (AHCST) in ultrasound (US) guided cannulation.

**Methods:** Inception cohort study of patients referred to the AHCST. Outcomes of interest collected were number of attempts at cannulation before and after referral, insertion

site, type of device inserted and recorded pain score for attempts prior to referral and for attempts by the AHCST.

**Results:** Between January and December 2016, 379 patients were referred to the AHCST for placement of a peripheral catheter under US. The median number of unsuccessful attempts before referral was 2 (IQR 2, 4), this ranged between 1 attempt to 10 attempts compared to only 1 attempt (IQR 1,1,  $p < 0.001$ ) with no more than 2 attempts in total by the AHCST and the first time success rate was 93% ( $n=348$ ). The median pain score for attempts with ultrasound was 2/10 (IQR 1-3) compared to 7/10 (IQR 5-9) for previous attempts without US ( $p < 0.001$ ).

**Discussion:** The results of our study emulate previously published studies where first time cannulation success was higher when ultrasound was used by trained operators for this cohort, it can reduce complications, procedural time and device failure.

**Conclusion:** The use of US guidance for peripheral catheter placement by the AHCST for patients with difficult venous access has been successful at our institution with 9 out of every 10 catheters inserted at first attempt with significantly lower recorded pain scores.

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## O-16

### Impact of a dedicated vascular access and infusion therapy team on the reduction of central line-associated bloodstream infections in pediatric patients

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**Introduction:** Vascular accesses are essential components of inpatient care. However, catheters used for vascular access are associated with substantial risk of primary bloodstream infection (BSI). A significant percentage (65-70%) of BSIs is avoidable using evidence-based practices. In the study, we evaluated the impact of implementation of a vascular access and infusion therapy team (VAT) on the incidence of central line-associated bloodstream infection (CLABSI) in hospitalized pediatric patients in a teaching hospital in Southern Brazil.

**Method:** The Quasi-experimental study was conducted at the Santa Casa de Misericórdia Hospital de Porto Alegre, Brazil. The Santo Antônio Children's Hospital, one of the hospital's complex, has 184 beds (40 beds of intensive care unit and 144 beds for inpatients). The pre-intervention CLABSI rate of 9 months (January to September 2015) was compared with the 9-month intervention period

(October 2015 to June 2016) and the post-intervention period of 9 months (July 2016 to March of 2017). The activities developed by the VAT include: daily assessment of patients with centrally inserted central catheter (CICC), dressing changes of CICC, insertion of peripherally inserted central catheter (PICC), management of catheters occlusions, infusion therapy consulting, CLABSI management, introduction of new technologies and continuing education of health professionals, patients and families.

**Results:** During the pre-intervention period, the mean rate was 5.56 CLABSI per 1000 catheters-days, compared with 3.69 and 2.56 CLABSI per 1000 catheters-days in the intervention and post-intervention periods, respectively. A reduction of 39% in the mean rate of CLABSI occurred during the intervention period and, a reduction of 54% was observed after this period.

**Conclusion & Discussion:** A collaborative model based on the improvement of process methodology is feasible and reduces the incidence of CLABSI in the pediatric population. Adherence to protocols that care for central line catheters is essential in reducing infectious complications.

## Session 9: The patient who needs dialysis, apheresis and ultrafiltration

### O-17

#### Be a lion and 'R.O.A.R.' to save the veins (and the lives) of children with kidney disease

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**Introduction:** Vessel preservation for future vascular access in adult patients with chronic kidney disease (CKD) is considered to be the standard of care in centres worldwide and multiple education programs worldwide promote this. Paediatric CKD patients form a unique cohort as they are likely to require multiple episodes of dialysis and several transplants throughout their lifetime. Yet the majority of paediatric centers around the UK do not routinely promote vessel preservation for future vascular access. '**Be a Lion and R.O.A.R.**' is the first vessel preservation education campaign designed specifically for children. We report our experience of this program during the pilot phase of its implementation at Great Ormond Street Hospital (GOSH).

**Methods:** 'Be a Lion and R.O.A.R.– Respectfully Object And Re-evaluate' is child friendly motto designed to promote vessel preservation in all renal patients at GOSH. Using a quality improvement driver diagram template, we identified and addressed three key factors: leadership and staff engagement, the implementation of a formal hospital policy and most importantly, active promotion of patient education. The program will be implemented in stages.

**Results:** During the pilot phase, three 'in person' education sessions by senior nephrology staff were held for medical, nursing, phlebotomy and theatre staff. Educational material was circulated to staff on the renal ward, in theatres and in the outpatient setting. Patient and parent education was commenced using age specific education leaflets, play therapy sessions, wrist bands alerts and wallet cards. Feedback and effectiveness of the campaign were assessed using online feedback forms for staff and parents. Audits of cannulation and outpatient phlebotomy continue ongoingly.

**Conclusion:** The 'R.O.A.R.' program of vessel preservation in children provides a strategic approach for the implementation of this important health intervention. This model is currently in the pilot phase at GOSH but could be applied to other paediatric centres worldwide.

## O-18

### Endovascular Treatment of Central Venous Stenosis and Occlusion: Vascular Access for Hemodialysis

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**Introduction:** The maintenance of the central catheter pathways are vital for hemodialysis patients. Central stenosis or occlusions due to recurrent catheterization can lead to catheter dysfunction and loss of vascular access. The aim of this study is to investigate the continuity of hemodialysis pathway after endovascular treatment in patients who have a history of catheterization failure due to central occlusion or stenosis.

**Material and Method:** Records of patients admitted to our hospital were obtained from hospital archives and images from the hospital radiology archive system between 2008 and 2014. Demographic characteristics, duration of dialysis, stenosis or occlusion level, primary and secondary patency rates of catheterization were evaluated.

**Results:** Forty four males and 31 females, the average age of 75 patients was 67 (16-84). The mean duration of dialysis was 8.6 (5-17) years. Seventy two successful endovascular catheters with percutaneous balloon and/or stent angioplasty were placed. In 65 cases, pathology was in the right or left brachiocephalic vein and superior vena cava, in 7 cases of iliac vein and inferior vena cava level. Because of the occlusion in 3 cases, endovascular treatment could not be performed, therefore, no intravenous catheter could be placed. In 71 patients, balloon angioplasty provided sufficient clearance to accommodate the dialysis catheter, whereas stent angioplasty was performed in one case because the stenosis was a long segment. Patient with catheter dysfunction was followed by balloon angioplasty. Primer patency rates were 78% for 6 months, 73% for 12 months, 54% for 2 years, 81% for 6 months, 76% for 12 months and 61% for 2 years in all cases.

**Discussion and Conclusion:** Central venous pathologies are common complications in dialysis patients and threaten the pathway of dialysis. The contribution of endovascular balloon and/or stent angioplasty to the sustainability of the dialysis pathway.

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## Session 10: The patient and the PICC: Minimizing complications

### O-19

#### Clinical outcomes related to over the wire catheter exchange in PICC reinsertion

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**Introduction:** Peripherally Inserted Central Catheters (PICCs) are the most common central venous catheter inserted. Catheter mal-position may occur at the time of insertion as well as post insertion. Although over the wire (OTW) exchanges have been performed for many years, there is no literature on the subsequent complications that can occur after PICC exchange related to infection (CRBSI) or upper extremity deep vein thrombosis (UEDVT). We set out to determine the adverse effects of OTW exchanges.

**Methods:** Data was collected on patients requiring a catheter exchange in two Canadian hospitals, one tertiary care centre from December 2014 to August 2015, and one community care hospital from April 2014 to March 2016. Data collected included success/failure of the exchange as well as any adverse events for 30 days post-exchange or until the catheter was removed. Outcomes evaluated were UEDVT, CRBSI and recurrent mal-positioning of the catheter.

**Results:** One hundred and ninety-nine patients had successful OTW exchange attempts. Most patients were referred for an OTW exchange due to increased external length of the catheter (90.0%). Patients were primarily referred from an oncology service (37.2%) or a medicine service (30.7%). The majority of catheters were in the right arm (81.0%) and primarily inserted in the basilic vein (80.0%). There were no UEDVT and no CRBSI post-exchange. Seven patients had bloodstream infections attributable to other causes. One patient had an embolus of the wire and a portion of the catheter requiring removal by interventional radiology.

**Discussion:** OTW catheter-exchange does not appear to increase the risk of UEDVT or CRBSI, and can be safely employed to manage PICC migration and malposition complications in both tertiary and community hospital settings. However, prior to implementing OTW exchange adequate training is essential to minimize risks and complications.

## O-20

### Use of peripherally inserted central line (PICC) in a tertiary care cancer centre in India

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**Background:** The use of central venous access facilitates delivery of systemic treatment in cancer patients requiring treatment for prolonged period. We report here the use and results of PICC in patients with solid tumour (73%) and haematological (27%) malignancies.

**Methods:** A total of 169 PICCs were inserted over 13 months i.e. Dec 2016 to December 2017. Out of the 169 PICC insertions attempted, 166 (90.5%) were successful. All PICCs were placed in the antecubital/upper arm using traditional method. All patients were assessed once a week.

**Results:** The median age of the patient was 44 years, and majority (68%) of patients were females. Total no of line days was 13367 with a median duration of catheter in situ of 100.5 days. Out of the 169 catheters inserted, 123 PICC catheters were removed. In 68% of patients the catheter was used for the intended purpose of treatment and removed after completion of treatment. The remaining 32% the PICC had to be prematurely removed because of following reasons: Site rash (2%), Infection (6%), Phlebitis (2%), Thrombosis (2%), Dislodged (4%), Malposition (3%), Failed (2%), Expired (7%), shifted to other hospital (1%), treatment regime changed (2%) and request for removal (2%). Median duration from catheter insertion to infection was 20 days (9-23 days)

**Discussion and Conclusion:** In our centre are lower than most published data. Among the 7 patients who had infection, the most prevalent organism was gram negative bacteria eg: Escherichia Coli (1 nos), Klebsiella Pneumonia (2 nos), Pseudomonas aeruginosa (1 nos), which was similar to a study conducted by Cotogni P et al. The malposition rate (3%) in our centre was also lower than reported in a paper where the rate was 62.9% (Venkatesan T et al). We conclude that PICC can be successfully used and maintained in majority of patients requiring long term treatment.

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## Session 11: Minimizing intraluminal contamination

### O-21

#### 30% ethanol - an effective and safe catheter lock solution

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**Introduction:** Effectiveness of 70% ethanol (EtOH) as a catheter lock in controlling catheter related infections has been discussed in many studies. However, such high EtOH concentration is also associated with increased risks of biofilm formation, protein precipitation, catheter occlusions and mechanical failures. In this study, we have determined the minimal ethanol concentration that imparts rapid broad spectrum microbicidal effects and has least impact on catheter tensile strength.

**Methods:** Candida albicans (CA), Staphylococcus aureus (SA), and Pseudomonas aeruginosa (PA) either in planktonic or biofilm form were exposed to EtOH at 10-70% concentration range for 24 hours followed by viable colony counts. The rate of kill of EtOH at 10-70% concentration range was also determined via sampling at 5, 10, 15, 30, 45, 60, 75, 90, 105, and 120 minutes. Additionally, a catheter lock regime was followed over 10 days for assessing impact of EtOH at 30% or 70% concentration on tensile strength, burst pressure and 10X pressure injection capabilities of polyurethane (PU) peripherally inserted central catheters (PICCs).

**Results:** Exposure to 30% EtOH was effective to eradicate all three test organisms in both planktonic and biofilm forms; while SA and CA took 15-30 minute exposure for complete kill, 5-10 minute exposure was sufficient to kill PA. PICCs locked with 30% ethanol were able to withstand 10 cycles of pressure injection, and had minimal impact on burst pressure and tensile strength. In contrast, PICCs locked with 70% ethanol failed in the pressure injection testing after 2-3 cycles and had significant impact on mechanical strength especially at the extension lines.

**Conclusions:** 30% EtOH is an effective and safer alternative to 70% EtOH for locking intravascular catheters as it can deliver rapid antimicrobial protection against fungi, gram-positive, and gram-negative bacteria, and PU catheters still meet mechanical strength requirements per the ISO standard.

### O-22

#### CVAD lock solutions: the debate, the triple threat and the solution

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**Introduction:** Catheter line associated blood stream infections and intraluminal occlusions are common complications in central vascular access devices (CVADs). There is an interrelationship between bacteria, biofilm, and fibrin that is responsible for the high incidence of treatment failure and catheter loss. It is through the understanding of these complex interactions in CVADs that we can develop strategies to improve outcomes. The approach to solving this complex clinical problem is multifactorial and finding an effective catheter lock solution is an important piece of the puzzle.

**Method:** The objectives of this presentation are to discuss (1) what we knew then and what we know now about intraluminal activity; (2) how important three interrelated processes (clot, bacterial colonization and biofilm) act as a whole rather than separate entities within catheters to cause bacteremia (3) understanding biofilm and how it contributes to antibiotic resistance, and (4) compare currently used catheter lock solutions.

**Results:** Most currently used catheter lock solutions are effective in some but not all processes that lead to complications. One lock solution will be highlighted as an effective strategy to combat the triple threat of clot, bacterial colonization and biofilm.

**Discussion:** Putting up bacterial roadblocks and reducing the risk of occlusion are extremely important, and making sure an optimal lock solution is instilled every time the catheter is manipulated is a key piece to the puzzle. The optimal lock solution should effectively prevent all three processes but must also eradicate bacteria and associated biofilm when needed.

**Conclusion:** Patients should be able to focus on their disease, not on complications associated with the device that is delivering their life-saving treatment. Bacteria, fibrin and biofilm contribute to these vascular access device related infections, occlusions and antibiotic resistance complications. The solution: an optimal catheter lock solution acting as a triple threat disinfectant.

## Session 12: The material of the devices

### O-23

#### **A cost effectiveness analysis of BioFlo® compared to PowerPICC Solo® peripherally inserted central catheters: The Ottawa Hospital evaluation**

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**Introduction:** PICCs are widely prescribed and purchasing decisions are often based on catheter cost alone without consideration of complication costs such as occlusions. This study evaluated whether the BioFlo® (BioFP) was a cost-effective alternative to the PowerPICC Solo® (PPS).

**Methods:** From the hospital's perspective, we performed a cost-effectiveness (CE) study on a cohort of 2504 consecutively inserted PPS 05/2012 to 01/2013 compared to a subsequent cohort of 8314 BioFP inserted 01/2013 to 12/2014. The dataset contained patient demographics, catheter characteristics, and complications: occlusion and deep vein thrombosis (DVT). The unit cost per occlusion was \$37.5 based on nurse time, and Cathflo® was \$60/dose. Multivariate regression analysis was used to derive cost and effect outcomes. A net-benefit regression approach was used to estimate incremental cost per aversion of one occlusion, one Cathflo®, and one DVT.

**Results:** The two cohorts were comparable as was the average cost of either PICC. The incidence of DVT was low and not different between cohorts. The rates of occlusion and Cathflo® use were however significantly lower with the BioFP. Logistic regression analysis showed the PPS was 51% [OR 1.51 (95% CI: 1.18, 1.93)] more likely to suffer an occlusion and 67% [OR 1.67 (95% CI: 1.27, 2.21)] more likely to require Cathflo® than the BioFP. The average cost per insertion of a PPS is expected to cost the hospital \$40.07 more than a BioFP.

**Discussion:** We found that the CE of PICCs is largely determined by the frequency of catheter occlusions and the cost of subsequent interventions. Occlusions were 51% less with BioFP; Cathflo® utilization 67% less than the PPS. Indirect costs of occlusions such as therapy interruption were not calculated.

**Conclusion:** At our institution the BioFP was a cost-effective device as it was significantly associated with the lower costs and better health outcomes.

### O-24

#### **Mid-clavicular lines, a safe option: 4-years experience**

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**Introduction:** Although the literature about mid-clavicular lines is limited, currently the use of more biocompatible materials and the microsealinger ultrasound guided technique can offer greater usefulness to this catheter.

**Objective:** To evaluate the clinical outcomes of the 4 Fr polyurethane mid-clavicular lines inserted in patients admitted to a tertiary hospital in Spain.

**Method:** Observational and prospective design. Sample includes all mid-clavicular lines, inserted using ultrasound guided technique at bedside and positioning the tip in the subclavian vein, during study period (March 2012-December 2016). This device was inserted in patients meeting one of the following criteria: a) >6 days long iv therapy and not hyperosmolar substances, b) difficult venous access, c) clinical condition contraindicates PICC. Primary outcomes were

the incidence of adverse event (AE) and the unexpected removal proportion. The follow up period was from insertion date to catheter removal. Incidence rates were calculated in percentage and in number of cases per 1.000 catheter days.

**Results:** 2275 mid-clavicular lines were inserted in 1841 patients. The average age of the patients was 68.9 (SD:16.68). Successful insertion occurred in 99.4% of the cases. Catheters were used for the infusion of antibiotics (85.1%) and saline therapy (17.1%). 45.6% of the catheters were used for infusing irritants. Catheters were in place for a mean of 21.82 days (SD:24.36) and 85.6% were removed successfully. The main reason of unexpected removal was the accidental removal (5.6%). Incidence of thrombosis was 0.4/1000 catheter days and bacteremia was 0.14/1000 catheter days. There were no phlebitis or infiltrations cases. The used of irritants was not statistically significant in relation to thrombosis ( $p=0.53$ ) or bacteremia ( $p=0.36$ ).

**Discussion & Conclusion:** Mid-clavicular catheters can be safely inserted and could be an option of a mid-term catheter which has low risk of adverse events and high probability of reaching the end of treatment.

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## Session 14: Tip navigation

### O-25

#### Empathy, the human technology

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**Introduction:** Lastly, in vascular access field new technologies and complications have been the focus of most of the international conferences. As clinicians, we must work by using the safest technology for the best patients' outcome. But patients are people, so technology shouldn't be the only and main aspect of the clinical practice. What happen when the clinical language is not clear for the patient? When there is no time for questions? When the catheter suggested is perceived as an enemy and not as a friend for the intravenous therapy? With this work, authors want to focus the importance of the patients' voice during their treatment and their perception of patient-clinician relationship.

**Method:** Review of the literature from 2016 to february 2018 has been conducted. Key words for the research have been "empathy", "compassion", "satisfaction", "quality of life". A total of 71 papers were found. Only 23 of those took under consideration the patients' point of view.

**Results:** Most of the paper reviewed have shown that patients and their families usually feel a lack of human connection with their health care practitioner, specially in some specific areas as palliative care, ICU, pediatrics, oncology and pediatric wards.

**Discussion & Conclusion:** Patients and their families not only request the best treatment possible and the best technology available, but also healthcare professionals that can deal with their fears and doubts. What patients really want from their clinicians is clear communication, effective empathy, respect for their decisions and lifestyle, and honesty. Authors find that these skills need to be learned during medicine/nursing school and improved through experience and mentoring in order to obtain an effective patient-clinician relationship.

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### O-26

#### Three types of Peripheral Intravenous Catheter Failure happening in hospital right now; 1: failure to appropriately use; 2: failure to insert on the first attempt and 3: post insertion failure

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**Introduction:** "Ever tried. Ever failed. No matter. Try again. Fail again. Fail better." Combining the data

analysis of three separate models regarding peripheral intravenous catheter (PIVC) pre-insertion, insertion and post-insertion a story of three specific failures is created.

**Methods:** A systematic scoping review of the literature for tool, rules and algorithms (TRA) for the insertion of PIVCs was carried out. Following data analysis of prospectively acquired observations and resultant multivariate logistic regression modeling we present 3 possible TRAs to “fail better” with PIVCs; firstly, to promote appropriate PIVC uptake; secondly, to obtain first time PIVC insertion success (using an additional nomogram method); and thirdly to reduce post insertion failure rates.

**Results:** *Pre-insertion:* Clinically indicated PIVCs (CPIVCs) model display an area under the receiver operating characteristic curve of 0.81 and at the best cut-off the model yields a specificity of 0.81, sensitivity of 0.71 a positive predictive value of 0.89 and negative predictive value of 0.57.

*Insertion:* Factors shown to be independently associated with FTIS were decreasing age, adjusted odd ratio (OR) for success, for each 10-year decrease = 1.26 (95% confidence interval (CI), 0.92, 1.73); palpable vein without tourniquet, OR = 1.91 (95% CI, 1.37, 2.67); experienced clinician, over 300 PIVC insertions, OR = 1.65 (1.17, 2.31); and, confidence of clinician (80 + /100), OR = 2.17 (95% CI, 1.58, 2.98). The area under the curve, of the final model’s receiver operator characteristic was 0.67, and has been presented as a nomogram.

*Post insertion:* Infiltration and occlusion account for most failure (n=54; 46%), and less likely when ANTT is used is (HR 0.63, 95% CI 0.42-0.96).

**Discussion:** Clinician, patient, product and technology factors influence PIVC failure. The mechanistic causes of post insertion failure require further scientific investigation. Our TRA for pre-insertion; insertion and post insertion outcomes requires external validation.

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## Session 15: Indications and advantages of glue

### O-27

#### Right femoral chemotherapy port-a-cath insertion

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In patient with end-stage renal disease (ESRD) or malignancy, we need to access their venous system for hemodialysis, and the delivery of medicine, chemotherapy, etc. This access becomes possible with the help of a central venous catheter. As its known, internal jugular vein is the most preferred access site for the catheter in patient who present with ESRD and or for delivery of the chemotherapy medicine, but in some occasion due to internal jugular obstruction, the catheter in femoral vein would be the other access that should be considered.

The importance of deep venous catheter complication is that they can result in disturbance or even termination of the treatment, and can even be fatal.

A 32-year-old woman due to Hodgkin’s disease received a chemotherapy port-a-cath via the femoral vein due to dysfunction of the access as a result of infection.

Since the infectious port was removed from the right part and the left part was under the pressure of the lymph nodes of the neck (investigating by sonography), in order to receive the chemotherapy, a 7-french- mini port was placed in right femoral vein. Cannulation was accomplished, without any complication, under sonography guidance. The catheter was placed with the help of fluoroscopy.

The chemotherapy was successfully done through the port and 15 months later without any side effects it was removed.

### O-28

#### Over-the-Wire Technique vs. Direct Catheter Insertion in Insertion of Peripherally Inserted Central Catheter

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**Full title:** Non-Inferiority Randomized Controlled Trial to Establish the Effectiveness of Over-the-Wire Technique (Seldinger Technique) vs. Direct Catheter Insertion (Modified Seldinger Technique) in Insertion of Peripherally Inserted Central Catheter (PICC-Line).

**Purpose:** The study objective is to compare the effectiveness and safety of the Seldinger technique (over-the-wire) using a long 145 cm guidewire with the modified Seldinger technique using a short 70 cm guidewire.

**Material and methods:** In this monocentric randomized-controlled trial a total of 60 subjects will be treated with either Seldinger technique or modified Seldinger technique in a 1:1 randomization study design. Primary endpoint is effectiveness measured by implantation time. Secondary endpoints are placement accuracy detected by tip location compared to chest x-ray and safety measured by the rate of documented periprocedural complications at follow-up (24 h to 2 weeks).

**Results:** Recruitment is ongoing. The primary endpoint will be presented at WoCoVA for the first time. In a pilot

study of 15 patients a difference of 81sec in mean duration (IR-Kit (mean±SD): 428±28 sec, MST-Kit: 347±81sec) was determined. To detect this effect with a power of 90% data of 28 patients are needed. Assuming a dropout rate of 20% at least 36 patients (18 per group) should be included in the trial. The significance level was set to 0.05.

**Conclusion:** The trial demonstrates the effectiveness of Over-the-Wire technique (Seldinger Technique) vs. direct catheter insertion (Modified Seldinger Technique) in PICC-Line insertion. The study results will be presented for the first time.

## Session 16: The patient and the CICC: Minimizing complications

### O-29

#### Intravascular devices and malignant wounds: focus on blood-stream infections

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**Introduction:** Malignant wound management often requires intravenous devices placement for specific treatment or supportive care. The prevalence of these fungating wounds is estimated between 5 and 10%. The infectious risk is not well known. The aim of this study is to evaluate the overall risk for blood-stream infection, to assess either the role of the fungating wound or the accountability of the device and to question our practices both in terms of type of devices and location.

**Methods:** we conducted an observational, retrospective monocentric cohort study including 91 patients with malignant wounds during two years. 56 patients(61.5 %) received chemotherapy, 22 patients(24.1%) received radiotherapy. 66 patients(72.5 %) had port implantation, 57 in superior vena cava, 9 in femoral vein. 68 devices implanted in superior vena cava, 13 devices in inferior vena cava. Most devices were ports.

**Results:** The prevalence of the wound-related blood stream infection is 4.4 % and the density of incidence is 0.18 / 1000 days-wound. The prevalence of blood stream infection (wound, catheter or other) is 9.9 % and the density of incidence is 0.41/1000 days-wound. 24 % of the patients have at least a removal of the device. 55 % of the patients implanted in femoral have at least a removal of the device. The mortality in the month after the blood stream infection is high (55 %).

**Conclusion:** infectious risk is high and blood stream infection is a factor of poor prognosis. Wound-related blood stream infections are under-estimated. It is difficult to filter out the wound and the cutaneous colonization in the genesis of catheter-related blood stream infections. This

study confirms the excess-risk of the femoral vein and the existence of colonization even far from the wound. A theoretical alternative could be the use of PICC, brachial device or limitation of devices implantation.

### O-30

#### Intravenous administration set (infusion tubing) replacement after 4 or 7 days is equally effective to prevent bloodstream infections (RSVP trial)

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**Introduction:** The aim of this trial was to compare 4- and 7- day administration (infusion) set replacement for the prevention of infection in central venous and peripheral arterial catheters.

**Method:** This multi-centre, pragmatic, randomised controlled trial was funded by the Australian National Health and Medical Research Council and included 10 hospitals (2011-2016). Adults and children with central venous (tunneled/non-tunneled central catheters, and peripherally inserted central catheters) or peripheral arterial catheters in place for >24 hours and expected use >7 days were randomly assigned (1:1) to replacement of infusions and tubing every (i) 7 days, or (ii) 4 days (controls). This included crystalloid, medication infusions, and non-lipid parenteral nutrition. Inotropes, lipids, chemotherapy, blood products and cyclosporine were excluded. Randomisation was centralised, computer-generated, stratified, and concealed. The primary outcome was catheter related bloodstream infection (CRBSI). Participants and clinicians were not masked but infections were blind-adjudicated. Analysis was intention to treat. Trial registration: ACTRN 12610000505000.

**Results:** After ethical approval, we recruited 2941 participants (1 catheter each) with 1375 central venous catheters; 846 peripherally inserted central catheters; and 720 arterial catheters. Average dwell times were 11.9 days (4-day group) and 11.7 days (7-day group). For arterial catheters, 7 day replacement was non-inferior to 4-day AS replacement (CRBSI: 7-day 1/357 [0.28%]; 4-Day 0/363 [0%]). For central venous catheters, CRBSI was equivalent with Day 7 or Day 4 AS replacement (Day 7: 20/1124 [1.77%]; Day 4 16/1097 [1.46%]; IRR 1.26, p=0.50). The 7 day group had one less AS replacement procedure on average than the 4 day group.

**Discussion:** The US Centers for Disease Control recommend administration set replacement every 4-7 days,

although there is global practice variation and inadequate evidence on this topic. Our results indicate IV administration set replacement after 7 instead of 4 days would reduce costs and workloads, with equivalent infection prevention.

## Session 17: The patient and the dressing of the exit site

### O-31

#### Potential contamination of tourniquets used by health professionals in peripheral venipuncture: results from a scoping review

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**Introduction:** Peripheral venipuncture is the most frequent invasive clinical procedure performed in healthcare settings<sup>(1)</sup>. In order to promote vascular distension, applying a tourniquet above the desired puncture site is recommended<sup>(2)</sup>. However, tourniquet characteristics and professional practices associated to their handling may contribute to microorganism dissemination<sup>(3)</sup>. Therefore, we aim to map all evidence on how health professionals handle tourniquets used in peripheral venipuncture, their degree of contamination and the risk of microorganisms transmission.

**Method:** Scoping review based following Joanna Briggs Institute's methodology<sup>(4)</sup>. The analysis of relevance of the articles, data extraction and synthesis was performed by two independent reviewers. The search strategy included all articles published until November 2017,

written in English, Portuguese, Spanish and French.

**Results:** 1.587 potentially relevant studies were identified and subject of analysis by title/abstract. Resultantly, fifteen primary studies were included in the review, published between 1986 and 2017, carried out in different geographic and clinical contexts.

Overall, a total of 1.104 tourniquets belonging to nurses, doctors, phlebotomists and lab workers were analyzed. Contamination rates varied between 10-100%, with the *Staphylococcus aureus* (n=14) being the most prevalent microorganism found. Overall, antimicrobial resistance to methicillin emerged as the most common (n=8), with rates between 2.2-44.1%. Tourniquets were reused and shared in periods from 3 days to 104 weeks, without proper decontamination procedures between. In addition, health professionals do not perform hand hygiene at the established times and reuse the same pair of gloves between

different procedures/patients, which may result in tourniquet contamination.

**Discussion & Conclusion:** Health institutions need to restructure and implement quality assurance systems based on the introduction of disposable single-use tourniquets, guidelines implementation, staff training and audits in order to guarantee that tourniquet use is in accordance with current evidence. Further studies should be performed to determine which professional practices may effectively reduce tourniquet contamination.

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### O-32

#### Impact Assessment of Stabilization Devices on CLABSI

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**Introduction:** For over three years, the Vascular Access Team (VAT) at University of Arkansas for Medical Sciences Medical Center have used the Subcutaneous Engineered Stabilization Device (SESD) on all PICC insertions, and have considered the impact of SESD on our CLABSI. Our institution's overall CLABSI rates have consistently been quite low (0.61 per 1000 catheter days in 2017). We assessed the impact of the SESD vs the Adhesive Engineered Stabilization Device (AESD) on our PICC related CLABSI.

The VAT at UAMS hypothesized the SESD reduces risk compared to AESD due to the stability, reduction of migration and dislodgement, and overall ability to clean 360 degrees around the insertion site. Establishing statistics to support our beliefs was possible after several years of use.

**Method:** A retrospective analysis of three years of PICC insertion data was performed. Data was analyzed in terms of securement type, inserter type, and extracting the total number of catheter days. All PICC insertions from 2015

through 2017 placed by the VAT included the use of the SESD, whereas the lines placed by IR used the AESD. Statistics are currently under review and expected to be completed by April 30th. Preliminary data and conclusions are provided.

**Results:** Preliminary data demonstrates a consistent risk reduction of at least 50% in utilization of the SESD versus the AESD. While not yet statistically significant ( $p=0.11$ ) the consistency through each year shows a directionally appropriate trend that reinforces our hypothesis of improved outcomes. This is clinically significant for our patients, even though not yet statistically significant.

**Discussion & Conclusion:** The SESD reduces the risk of CLABSI as compared to AESD. Possible keys to this infection risk reduction are associated with the stability of catheter from time of placement, and ability to clean site 360 degrees during care and maintenance.

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## Session 18: The patient and the totally implantable venous access device

### O-33

#### **Patient information after port implantation : all he wants and needs to know. A once failing method can lead to a successful and harmonized protocol indeed!**

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We've been implanting more than 2000 ports each year for a decade. All our patients have our private mobile number and may use it day and night for any question ! therefore, we need to give them all the information they need to know, otherwise, our life can quickly become a nightmare. We had to find the best way to give all these post operativ's information and not to forget any of them. We first failed but finally succeeded ! here is our story...

We first gave 17 answers to what we thought were the most common questions after port implantation. We started in May 2017. It was disastrous ! the nurses had to answer many questions and sometimes were unable to, and systematically asked us (doctors) for help. Some patients

remained in the relaxing ambulatory room more than one hour, to finish reading all the questions and answers ! As a consequence, nobody was happy. We thought it over and decided, to switch the information to give, from the patients to the nurses (first). Finally, we taught (twice) every single person (nurses, stretchers, hostesses...) who might be in touch with our patients, from the beginning to the end of the day.

Everybody was happy! Patients could have right away the information they wanted, paramedics could answer quite every question and patients could leave the ambulatory relaxing room as fast as before. No more phone calls for further answers about the 17 questions. We added some more questions collected after three months of use.

We found a good way to answer quite all outpatients' questions by teaching every single person in touch with them in our center. we can discuss the inclusion of stretchers, hostesses, and how to improve the information we give to everyone.

### O-34

#### **Introducing the top up catheter care (tucc) box to improve the care of long term vascular access devices (vads) in an acute hospital setting**

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**Introduction:** Establishing and maintaining the skills of nurses who care for patients with VADs is an ongoing challenge in an acute hospital setting. A high turnover of staff and busy working environment can contribute to sub-optimal practice in the care of long term VADs. The aim of this presentation is to show improved compliance with the weekly VAD dressing regime with the use of the TUCC box.

**Method:** The TUCC box provides information and supplies at the point of use. The box is labelled with details of the type of VAD, date of insertion, brand, external catheter length, tip position and dressing day. Inside the box is a photographic step by step guide on how to perform the dressing. Also inside the box are the clinical supplies required to perform the weekly dressing. The boxes are topped up once a week by the vascular access team.

The TUCC box was first introduced in a 500 bedded acute hospital and proved very popular with staff and patients alike. From an initial reluctance to take responsibility, the nursing staff began to take ownership of the weekly dressing regime. The benefit was clear to all but unproven by audit data.

When the author moved to a 1000 bed teaching hospital the TUCC boxes were again introduced. This time a pre and post introduction audit was completed.

**Results:** Data was collected for 6 weeks prior to the launch of the TUCC boxes and 6 weeks after the introduction. Results showed significant improvement in compliance with the weekly VAD care regime (79% pre, 92% post introduction).

**Discussion:** The TUCC box is an inexpensive adjunct that may help to minimise the complications that may occur from the sub-optimal care of VADs.

**Conclusion:** The use of the TUCC box improves compliance with the care of VADs

## Session 19: Minimizing extraluminal contamination

### O-35

#### Implementation and evaluation of peripheral intravascular catheter flushing practice: A stepped wedge cluster randomized trial

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**Introduction:** Regular intermittent flushing of peripheral intravenous catheters (PIVCs) with Sodium Chloride 0.9% is recommended to prevent mixing of incompatible medications and reduce buildup of biological material that may contribute to PIVC failure. Despite the promotion of flushing to maintain catheter patency, high rates of PIVC failure (~40%) persist, in part due to poor adherence to flushing guidelines. The aim of this study was to evaluate the impact of an educational intervention about PIVC flushing practice, on patient and device outcomes.

**Method:** This study was a single centre, incomplete, stepped wedge, cluster randomized trial with an implementation period. Medical and surgical patients >18 years of age with a new PIVC inserted and expected to be insitu for more than 24 hours were eligible for inclusion. Practice during the control period was current standard care (including *as required* flushing with manually prepared flushes). The education package was multi-modal consisting of in-person training, written guidelines, and online resources to raise awareness of, and promote adherence to guidelines (including single use, manufacturer prepared, prefilled syringes). The primary outcome was PIVC failure (occlusion, infiltration, dislodgement, phlebitis and infection).

Secondary outcomes included individual causes of failure and adverse events.

**Results:** A total of 619 patients from 9 clusters (wards) were enrolled in the study (n=306 with 828 device days in the control period, and n=313 with 785 device days in the intervention period). Preliminary 2 group analysis significant reduction in the proportion of PIVC failure (control 30% vs intervention 22%  $P=0.032$ ), but the difference in rate per 1000 catheter days was not significant (control 110 v intervention 87.9, IRR 0.80  $P=0.192$ ). Full analysis will be at the cluster and patient level.

**Conclusion:** The preliminary results of this study suggests the positive effect of the reiteration of practice guidelines for PIVC flushing practice on outcomes.

### O-36

#### A national evaluation of safety peripheral intravenous catheters (PIVC) in the National Health Service (NHS) (A Department of Health & Social Care Initiative)

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**Introduction:** Studies have demonstrated that around 50% of all hospital in-patients require the insertion of an intravenous catheter. The NHS spends approximately about £29 million per year on sales for PIVC with over 300 different variations of products. The PIVC national evaluation, a first of its kind, is part of a series of national project governed by the Department of Health and Social Care led by NHS Clinical Evaluation Team (CET) conducted in a robust and independent manner.

**Method:** This evaluation process was undertaken across all regions in England by the CET. Stakeholders' engagements and clinical conversations took place around the country. The team utilized a five stage clinical pathway-product range assessment, intelligence gathering, stakeholder engagement, clinical criteria build, product evaluation and clinical review report.

**Results:** This first phase of the process has provided an opportunity to capture valuable information about what clinicians need PIVC to do. This clinician-defined criterion ensures quality, objective statements to which the next stage of the evaluation process will be based upon. PIVC design and clinical acceptability in practice will be examined. Data will be presented from the first phase of the evaluation.

**Discussion and Conclusion:** The majority of studies and researches about PIVCs to date have been conducted about care and management mostly in economically developed nations. Clinical acceptability studies on the other hand, are often carried out by industries as part of

commercial promotion of one product against another. A comprehensive report will be providing clinical view in partnership with NHS colleagues. It will have a national significance in the procurement of PIVC which will consequently have high impact on patient care. This will ensure a high quality national catalogue of PIVC delivered for the NHS. By highlighting unmet clinical needs it will also support innovation from clinicians and industry.

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### Session 20: Tip location

#### O-37

#### Left superior vena cava hemodialysis catheter

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A persistent superior vena cava (PLSVC) is one of the most common variation in thoracic vein anomaly which have been found in 0.3-0.5% of individuals in general population and up to 12 % in association with congenital heart diseases.

As it's known, the right internal jugular vein is the most preferred access site for hemodialysis catheter in patient who present with end stage renal disease, but in some occasions due to right internal jugular vein stenosis and also the high risk of infection in placing the catheter in femoral vein, the left internal jugular vein would be the other access that should be considered about the probability existence of persistent superior vena cava.

We report a case of 33 years old woman with end stage renal disease who had suffered from femoral vein catheterization infection and also failure and thrombosis of right internal jugular vein. As a result it's been decided to place the catheter in left jugular vein by fluoroscopy which persistent superior vena cava have been found

during the procedure and we set the catheter down in it. She was followed and hemodialysed after that for about 3 months that finally the fistula was created to take the place of it, and the catheter in persistent superior vena cava successfully discharged.

#### O-38

The abstract has been withdrawn.

### Session 21: FICC – Femorally inserted central catheters

#### O-39

#### Establishing a new standard of care for femoral lines: The mid thigh femoral PICC, indications, case studies and results from a 700 bed trauma center

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Central venous access devices have been examined in the literature from their indication and necessity to their location and associated complications. In situations where upper extremity central access is contraindicated such as: upper extremity deep vein thrombosis, contractures, arterio-venous fistulas, existing tunneled catheters, superior vena cava syndrome and unsafe areas for insertion or dwell time such as a jugular vein in a patient with a tracheostomy, the femoral vein remains the most common option in adults. While studies state that the risk of inserter related infections with regards to the femoral and internal jugular veins are equal, the care and maintenance of these sites and associated contaminates are not. Through a series of case studies this presentation will examine the use of the distal femoral vein in the mid thigh for long term venous access in patients where the upper extremities are contraindicated. This practice change and implementation in a 700 bed trauma center will be discussed.

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**O-40****PICC insertion via femoral vein at mid-thigh for patients with superior vena cava syndrome**

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**Introduction:** Usually, PICC is inserted at the upper arm and the tip is located at the svc. however, some patient with superior vena cava syndrome(SVCS)that leads to obstruction oO blood flow through the SVC.under these circumstance, the femoal vein are frequently used when patient need chemo therapy.but cannulation At the femoral triangle is less desirable due to higher complication rates.it is also uncomfortable for activity.we explore the feasibility of inserting PICC through femoral vein at mid-thigh for patient with SVCS.

**Method:** We selected mid-thigh femoral vein for PICC insertion,unser Ultrasound guild and combind the MST.we used 4Fr single lumen or 5Fr dual power picc, the tip of catheter is located at L2-3.

**Results:** There were 54 patients(male39,female15)been inserted PICC at mid-thigh,the success rate was 100%,one catheter had been used for 316days. the average catheter day was 78±54.14.the overall complication rate was 11.1%, which occlusion rate was 7.41%,catheter dislodgment rate was 1.85%,patient can do normal activity such as walking etc.

**Discussion & Conclusion:** The femoral vein at mid-thigh is an another option for patients who has SVCS, it has lower incidence of complication than traditional method,and longer dwell time, our study suggests that PICC inserted at mid-thigh can be successfully utilized for patient who has SVCS.

**Poster sessions****P001****Unsuccessful in PICC insertion: How to improve clinical practice?**

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**Introduction:** The process of multiple peripheral punctures during hospitalization increases the stress of the patient and family as well as generates an additional work to the nursing team as a consequence of the frequent interrupting drug delivery as well as patient's injuries in peripheral venous network due to new insertions. The PICC (Peripheral Insertion Central Catheter) is an option for intravenous therapy since it reduces pain related to puncture attempts. It is indicated for prolonged treatments. 1-2

Because of its complexity, PICC insertion nurse professional need to be properly trained and prepared to perform an evaluation and as well as be assertive in the installation of the catheter in order to avoiding complications and/ or failures during the PICC insertion. This study aims to evaluate cases of failure in PICC insertion process and to detail the interventions mentioned in the literature to prevent its recurrences.

**Method:** A retrospective, quantitative, cohort study evaluating ultrasound-guided PICC insertion from January 2016 to December 2017 in a private hospital. Inclusion criteria: Patients who failed during of the PICC insertion performed by nurses of PICC team.

**Results:** 2.132 attempts to introduce PICC were evaluated, of which 42 were cases failed. Demographic and clinical characteristics were used to define population. In regards to the nursing team involved in this analysis, 70% were made with professionals with more than 4 years of experience. The cases of failure corresponded to 2.27% of the total number of PICC passages in 2016 and 1.69% of the total number of PICC passages in 2017.

**Discussion & Conclusion:** The main causes of failures were evidenced by factors related to the insufficient professionals' expertise at the time of accomplishment of the procedure<sup>3-4</sup>. The constant training of nurses greatly reduces opportunities for failure.

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**P002****Peripherally inserted central venous catheter: An alternative for improving the quality of nursing care**

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**Introduction:** Evidence suggests high rates of complications related to the peripheral venous catheter (PVC). Among causes is the administration of irritant/vesicant medicine, with  $\text{pH} \leq 5$  or  $\geq 9$  and osmolarity  $\geq 900$  mOsm/L<sup>(1-2)</sup>. These risk factors are indications for using peripherally inserted central venous catheters (PICC)<sup>(3-4)</sup>. Therefore, their use may be an alternative for improving the outcome of nursing care. However, safely using PICC requires the acquisition of knowledge based on scientific evidence, because care differs to that usually provided to patients with PVC<sup>(4)</sup>.

**Objective:** Analyze the cumulative incidence of complications in Portuguese patients with PICC or PVC after implementing an educational intervention on care with PICC.

**Method:** A theoretical and practical educational intervention with nurses of a service of medicine in Portugal, on care for patients in the insertion, maintenance and monitoring of the PICC. A cohort pilot study was held during 40 consecutive days, in 2016. Patients included were adults: nine patients with PICC and 36 with PVC. Descriptive statistical analysis was performed.

**Results:** Complication in patients with PICC: obstruction (22.2%); PVC: Phlebitis (22.2%), infiltration (38.8%), obstruction (27.7%), accidental removal of the PVC (47.2%), fluid leakage on insertion (36.1%) and pain at the site of insertion (5.5%).

**Discussion & Conclusion:** Permanent education is essential to improve nurses' knowledge of PICC care, and is a strategy to achieve higher levels of qualification and the transformation of practices<sup>(5)</sup>. PICC showed a lower incidence of complications when compared to the PVC, becoming a favorable alternative for the improvement of the quality of nursing care to patients who have a medical indication for PICC. Ensuring the criteria of selection of a venous catheter is essential in order to reduce complications, improve the results of nursing care and promote the patients' well-being<sup>(3-4)</sup>.

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## P003

### Misleading artifact in vascular ultrasound – A case report

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**Introduction:** A 54 years old woman, undergoing chemotherapy for an ovarian carcinoma, came to our attention referring swelling of the superior right arm, one week after the positioning of a PICC. The patients was highly concerned about PICC correlated adverse events, since four years before she had been previously implanted with another device (on the right arm), that was removed because of the development of pericatheter thrombosis which completely resolved.

**Method and Result:** Before the implantation we performed an ultrasound vascular assessment to confirm the complete resolution of the previous thrombotic event and we decide to position PICC device on the right arm because of a previous complete left axillary lymphadenectomy. During the follow up visit in order to exclude another thrombotic event we assessed vascular structures by ultrasound to evaluate the course of the catheter inside the right basilica vein.

The right subclavian vein was found and followed along his course with a high resolution linear probe (13 MHz). Inside it we highlighted the typical binary sign created by the catheter.

A second deeper similar-vascular structure was found at the level of the medial part of the vein. In this we can highlighted the passage of an infrastructure device as well. Both of the two vascular-like structures were evident as well with the use of a second probe of 10 MHz.

We used the methodic intracavitarius ECG for the differential diagnosis between dislocation of the catheter against ultrasound artifact. The ECG trace was compatible with a right locating of the catheter tip in the cavoatrial junction.

**Conclusion:** The ultrasound image observed is compatible with a reverberation, an artifact created when the ultrasound beam hits a highly reflective anatomic structure perpendicularly (in our case the clavicle). This phenomenon determined the vision of an mirror image of the subclavian vein.

## P004

### Experience in the implantation and management of peripherally inserted central catheter (PICC) in oncological patients. One year review

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**Introduction:** The management of venous capital in oncological patients under treatment with chemotherapy is essential to guarantee their integrity and future availability as well as to reduce the risk of extravasations.

In 2016, at the Mateu Orfila General Hospital, peripherally inserted central catheters (PICC) began to be implanted in oncology outpatients by nurses using an ultrasound-guided technique.

The objective of this study is to present our experience in the implementation and management of PICC and to identify late complications and reasons for catheter removal.

**Method:** Scope: Mateu Orfila General Hospital (142 beds), in daytime oncology Hospital, 18 spaces of treatment with an average of 110 patients/month in active treatment with chemotherapy.

Design: Descriptive retrospective analysis of the use of 35 PICC implanted between November 2016 until December 2017.

**Results:** 17 PICC of the 35 implanted corresponded to breast pathology.

100% of the devices were implanted in the basilic vein using an ultrasound-guided technique.

At the end of the review, 20 PICC were removed; the average implantation duration was 104,2 days and the most frequent of catheter removal was the completion of treatment in 12 patients.

**Discussion & Conclusion:** The implementation of the PICC has meant an improvement in the quality of care as well as an increase in patient and professional safety. There is an increase in patient satisfaction by decreasing the number of punctures and by the relative simplicity of the procedure, although it requires additional training and experience on the part of the professional.

Finally it is important to review a correct choice of the device to be implanted from the diagnosis to minimize the need for changing the vascular device.

## P005

### **Incativ programme (intravenous therapy quality indicators): A way of improving by learning**

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**Introduction:** Safe vascular access is an important issue in daily nursing practice. INCATIV Index measures vascular access quality. The aim of this study is to demonstrate that “formative pills” about the proper vascular access care to health personnel and the nursing rounds improve it.

**Method:** Three cross-sections were made in 2017 (two pre-intervention and one post) in 32 hospitals in the Valencian Community. Trained observers collected variables using a CRD. Hospitals were classified by categories. 1-hour face-to-face training sessions to hospital nurses were done to reinforce the prevention of intravascular catheter-related infection bundle.

**Results:** Bonferroni post-hoc test in ANOVA has been used to evaluate the impact of training activities on the INCATIV Index (II). Training activities have reached to 83% of the nursing staff of participating hospitals. All hospital categories have improved from C1 to C3, except for primary hospitals that get worse statistically from C2-II=9,038(SD=1,038) to C3-II=8,513(SD=1,705) ( $p<0,001$ ). INCATIV Index varies between 7,744(SD=1,862) in C1 in secondary hospitals to the highest value in C3 in specialized hospitals with an II=9,112(SD=1,179) ( $p<0,001$ ). There is a decrease of the phlebitis rate from 4,5% to 1,8% ( $p<0,001$ ). A positive evolution is observed in the use of the recommended devices by INCATIV bundle. Transparent dressings increase from C1 to C3 in 8,6%. Likewise, we observe the tendency to use closed intravenous systems from 58,6% to 77,9% ( $p<0,001$ ) with an increase in the consumption of bioconnectors, extensions with bioconnectors and closed system IV peripheral catheters.

**Discussion and conclusion:** Using the evaluation tool “INCATIV Index” is the key element to measure compliance with vascular access care. Small training interventions, the use of the proper devices and a continuous monitoring of vascular accesses integrated in a safety environment, improve the preventive attitude of nurses in the management of the vascular patrimony's patient.

## P006

### **Vascular complication of central venous cannulation – Endovascular treatment**

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**Purpose:** A retrospective analysis of an endovascular treatment of arterial complication during central vein cannulation.

**Materials and methods:** From November 2003 to January 2018 we treated 21 patients (8 men, 13 women, range 32 – 90 years, mean 67,8 year) with arterial injury due to cannulation. The catheter (7-14 F) was misplaced into the artery in 12 cases (subclavian artery in 10 patients, carotid artery in 2 patients). Eleven catheters were left in situ, one 14 F dialysis cannula was removed by nephrologist.

Arterial laceration with extravasation was in four patients, with arterial pseudoaneurysm in another 4 patients. Venous laceration with pseudoaneurysm was in one case. Blind puncture without ultrasound guidance was used in all cases. Following endovascular techniques were used: sealing with percutaneous closure device in 6 patients, closure device with balloon tamponade in two, closure device and stent-graft placement in one, stent-graft placement alone in two, stent-graft placement with embolization of bleeding arterial branches in one cases, embolization in 6 cases (coils 4x, particles 2x), percutaneous thrombin injection in 3 cases.

**Results:** Mean follow-up was 38,2 months (range 0,1 –78 months). Bleeding cessation was achieved in 95,2 % (20/21). Patient with unsuccessful manual compression after extraction of dialysis catheter underwent surgical treatment before and after endovascular procedure and died 8 days after endovascular procedure from multiorgan failure due to hemorrhagic shock.

**Conclusion:** Endovascular management of arterial laceration and catheter misplacement in the artery during central vein cannulation seems to be very effective. Large-bore catheter malplaced into the subclavian artery should be left in the place. Endovascular management offers a less invasive alternative to vascular surgery.

## P007

### Reliability of cutaneous landmarks in catheter length assessment during PICC insertion

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**Introduction:** the “central catheter” feature is strictly dependent on the correct position of the PICC’s tip, so it is important to have an estimated measure of the catheter to reach the cavo-atrial junction (CAJ). Especially for “distal trimming PICCs”, the reliability of cutaneous landmarks thus becomes a determining factor for correct positioning and proper catheter management.

**Objective:** Evaluate the reliability of cutaneous landmarks in catheter length assessment during PICC insertion.

**Methods:** in 530 PICC insertions, from 2014 December to 2016 October, Picc Team ASST-Monza recorded estimated length by cutaneous landmarks and effective length by EKG guided tip location. Two distinct techniques were used (we called them M1 and M2). All data were stored in Picc Team ASST-Monza database and analyzed by SPSS ver. 24.

**Results:** Both M1 and M2 were significantly associated with EKG guided, but the regression line differed from identity indicating a bias between M1/M2 and EKG. The

average bias between M1/M2 and EKG guided catheter length were  $3.77 \pm 2.44$ cm (IC 95%: 8.56 -1.02) and  $3.28 \pm 2.57$ cm (IC 95% : 8.32 -1.75) respectively.

**Discussion and conclusion:** Cutaneous landmarks with post procedural tip location techniques, could easily determine an over-advanced positioning of the catheter, so we have two chances: tolerate a suboptimal tip location (with increased thrombotic risk and arrhythmias) or retract the catheter (with increased infective risk, additional manipulation and delayed time of insertion). Q1 of the average error on M1 and M2 (2 cm) indicates that arbitrarily subtracting 3-4 cm from the preventive measures does not always provide a more precise indication. Cutaneous landmarks in PICC insertion appeared unreliable, if associated to post procedural tip location. They may be useful in EKG guided tip location, for increase security and optimize the “out of skin” catheter tract.

## P008

### Prevalence of venous thromboembolism associated peripherally inserted central catheters: A cohort of more than 700 patients

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**Introduction:** The use of peripherally inserted central catheters (PICC) has increased substantially in daily practice. Venous thromboembolism (VTE) is a possible major complication of PICC. Reported prevalence is very wide (2 to 75%), depending of the study population (Fallouh N et al, 2015). Rate of VTE is one of the standards of good practice in this cenario. Objective of this study was reported the prevalence of VTE in our institution.

**Methods:** Restropective cohort study. Data was extracted from the flowsheets fullfiled by PICC team and from review of the patients eletronic medical records.

**Results:** Between January 2012 and August 2017, 953 PICC were used in 778 patients (1,22 catheter per patient; range 1 to 8). Mean age of patients was 64,3 years-old (SD±20,3 ). PICC was inserted mainly on right upper arm (97,1%), on first attempt (67,5%) and by indication for use of antibiotics (82,4%). Groshong PICC was the most common catheter (84,8%). Venous thrombosis was suspected in 54 patients. Venous Doppler ultrasound detected new superficial vein thrombosis (basilic or cephalic vein) in seven patients (0,73%) and deep vein thrombosis (axillary or subclavian vein) in four patients (0,42 %). Full anticoagulation was prescribed for four patients. No pulmonary embolism was diagnosed in the follow-up.

**Conclusion:** Prevalence of venous thromboembolism associated PICC was low in our institution, assuming a good practice. These results should be confirmed in a prospective study.

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### P009

#### Implantation of nursing prescription and standard request for the use of central peripheral insertion catheter in a private hospital in southern Brazil

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**Introduction:** The Central peripheral Insertion catheter (PICC) is one of the choices for drug therapy infusions in adult, pediatric and newborns patients, presenting a low incidence of complications and low rates of infections.

**Objective:** To describe the implementation of a standard prescription for applications and evaluations of PICC, as well as the nursing prescription with care directed to the maintenance and manipulation of this catheter.

**Methodology:** In order to standardize these requests, a prescription item has been created where the doctor requests the evaluation for the team of infusion therapy, thus disPICCing the process of the passage of the. The team of nurses from the Infusion therapy team identifies the patient and makes an assessment of the puncture site and the possibility of the patient receiving this catheter. A nursing prescription occurs, with the material for carrying out the procedure and the care related to the catheter. A guidance guide is given to the patient to maintain this access. The nursing team that will be performing this patient's care with PICC receives a primer with instructions on how to manipulate access, which syringes are possible to use, how to perform medications. The Infusion Therapy team performs the first curative and is available for questions and intercurrents related to the catheter. Once a month the patients with vascular access are visited on a day of audit and at this time the PICCs are also evaluated and reinforced the handling with the device.

**Results and conclusions:** the standardization of the application of PICC and the prescription of nursing, informed and formalized the request for passage of catheter, bringing safety to the patient and to the professional who performs the procedure, in order to standardize the care Provided, also demonstrating the nursing actions registering the care regarding the PICC.

### P010

#### Investigation of professional identity and related influence factors among infusion therapy nurse specialists from one training center in China

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**Introduction:** The nurses with high level professional identity show better career motivation. It has been 8 years since the first certification training course of infusion therapy nurse specialists. It is important to investigate the professional identity and explore the influence factors.

**Objective:** To investigate the situation of professional identity and working among Infusion therapy Nurse Specialists and analyze the influence factors.

**Methods:** The General Information Questionnaire, Working Status Questionnaire and Nurse Professional Identity Scale (NPIS, Chinese version) was used to investigate 250 nurses who graduated from one Clinical Nursing Specialist training center in Sichuan province of China.

**Results:** Their professional identity score was 1.33~5.00, and the average score was  $3.92 \pm 0.53$ . The descending order of the score in the 7 dimensions was the sense of self efficacy ( $4.14 \pm 0.58$ ), the sense of feeling hold-in  $4.10 \pm 0.60$ , the sense of coherence  $3.96 \pm 0.61$ , the sense of patient influence  $3.90 \pm 0.67$ , the sense of meaning  $3.88 \pm 0.64$ , the sense of self determination  $3.76 \pm 0.76$ , the sense of organization influence  $3.58 \pm 0.67$ . Multiple Linear Regression Analysis showed that, post, central venous catheterization type and consultation type of infusion therapy entered the regression equation.

**Conclusion:** The professional identity of Infusion Therapy Nurse Specialists from one Clinical Nursing Specialist training center in Sichuan province was at the middle high level. The score in the sense of self efficacy was the highest, while that of the sense of organization influence was the lowest. The Infusion Therapy Nurse Specialists at the management position, with multiple central venous catheterization skills and with multiple infusion therapy consultation tasks had higher level of professional identity.

### P011

#### Skill assessment of simulation training for ultrasound-guided central venous catheterization

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**Introduction:** Ultrasound-guided technique is a gold standard of central venous catheterization. However, lethal complications have been reported, even while using ultrasound guidance. We introduced skill assessment to the conventional hands-on seminar. A high task test is likely to produce negative emotions. On the other hand, positive emotions can produce motivation to learn and facilitate the development of competence. Therefore, in this study, we surveyed the emotional impact of the task test on participants.

**Method:** The ethics committee approved the research. Residents were recruited using a poster. The seminar was scheduled for 180 minutes and consisted of a short lecture, demonstration by an ultrasound expert, and hands-on training using a simulator under expert supervision. The residents freely participated in the task test. Skill assessment was conducted based on three factors: needle visualization (evaluated to 5 levels, 5: clearly visible, 1: invisible), hand-eye coordination (5: excellent, 1: unacceptable), and no penetrating the posterior wall. The achievement goal was set to level 3 or higher, and necessitated no posterior wall penetration. A post-seminar evaluation questionnaire was administered, and self-confidence was measured using a Likert scale.

**Results:** Twenty-three residents participated. All residents took and passed the task tests until the end of the course and agreed to respond to the questionnaire. They were very satisfied with the course (median 5: “extremely satisfied,” range 5-4) and reported high levels of self-confidence (median 4: “my skill progressed well,” range 5-3).

**Discussion and Conclusion:** The task test evaluating skills is key for outcome-based education. Usually, tests cause a negative impact on education. However, trainees are likely eager to understand their own skill levels. This seminar resulted in high satisfaction and self-confidence. We believe that this task test for ultrasound-guided central venous catheterization will have good emotional impacts.

### Funding

This research was supported by AMED under Grant Number JP15km0908001.

### P012

#### Short- and intermediate-term use of peripherally inserted central catheters in Europe: A systematic literature review

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**Introduction:** The aim of this systematic review was to examine the efficacy, safety, and costs associated with the short/intermediate-term use of peripherally-inserted central catheters (PICCs) in comparison with centrally-inserted central catheters (CICCs) and peripheral intravenous catheters (PIVCs) among adults in Europe.

**Method:** Medline, EMBASE, Cochrane, and EconLit databases were searched for records dating from January 2000 to March 2017. Full-text versions of potentially relevant records were assessed according to pre-specified inclusion and exclusion criteria.

**Results:** Of 457 identified records, 56 studies were included in the review. Data ranges for efficacy outcomes across all studies did not suggest any clear advantages or disadvantages between PICCs and CICCs or PIVCs. However, individual studies reported statistically significant higher patient satisfaction with PICCs versus both comparators ( $P < 0.001$ ), and fewer venipunctures required for successful insertion compared with PIVCs ( $P < 0.01$ ). Across studies, rates of removal due to complications were 3.5–48% with PICCs compared to 67–81.2% with PIVCs and 26–78% with CICCs. The proportion of patients reporting catheter migration/dislocation was 0–7.7% with PICCs compared to 9.6–15% with CICCs, whereas the proportion was 0–27.2% versus 0–9.6%, respectively, for those experiencing venous thrombosis, with individual studies reporting significant differences ( $P \leq 0.01$ ). Limited evidence showed higher costs with PICCs than with CICCs or PIVCs, but not all relevant costs were included in the analyses.

**Discussion & Conclusion:** This review showed that PICCs offer several advantages compared to CICCs and PIVCs, including greater patient satisfaction, fewer complications leading to removal, and less catheter migration/dislocation, despite a slightly higher rate of venous thrombosis.

### P013

#### Bewilderment and dismay at lack of staff competence

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**Introduction:** As there are many complications associated with vascular access devices (VADs), healthcare professionals (HCPs) dealing with VADs require knowledge and skills to manage them safely. It is often decided what training and education is required at a local level. As a result, many HCP do not receive education and training for VAD use which causes poor and varied practice. This issue was highlighted in a recent study focusing on the patient's experience of vascular access.

**Method:** Semi structured interviews were conducted with eleven patients. Five patients with a peripherally inserted central catheter, three patients with a tunneled central venous catheter and three patients with a totally implanted vascular access device. Analysis was done using interpretive phenomenological analysis.

**Results:** Patients highlighted issues with lack of competence and confidence of practitioners caring for their VADs. Some patients who presented for routine care or blood sampling, discovered that HCP's were unable to use them and sometimes resorted to performing venepuncture or cannulation rather than use their device. This was traumatic for the patients. The patients also sensed that some HCP were 'frightened' of their devices. This left the patients feeling bewildered, confused and anxious. Practice variation was also highlighted and this caused the patients to feel anxious about the care being delivered.

**Discussion:** This study highlights issues with vascular access care and maintenance training. It suggests that training is sporadic and not widespread. This leads to an inability of some clinicians to manage long term devices as well as poor practice and practice variations.

**Conclusion:** As more patients receive long term devices, we should ensure that training and education for the care and maintenance of CVADs is introduced earlier in nurse and medical staff training. This training should be mandatory. This will improve the trust and satisfaction of patients whilst reducing device complications.

## P015

### Evaluation of the proficiency in the skill for ultrasound-guided central venous catheterization on the simulation training using optical needle guide

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**Introduction:** Central Venous Catheterization (CVC) causes complications at a few hundredth of a percent. Though ultrasound-guided CVC is reported to reduce the rate of complication, the misunderstanding due to the characteristics of the ultrasound-image, such as virtual image, may lead to misjudgments and cause severe complications. It is necessary to acquire the technique of safety vascular puncture with recognizing the characteristics of ultrasound-image

**Method:** We developed original CVC training simulators made by 3D printer. This simulator contains CMOS sensor which records the intravascular image of the simulator vessel, and can visualize the practitioner's skill with the

needle tip position in the vessel. We also made the new device for vascular puncture training. The device has a slit and a narrow mirror on the center, and the user can check the needle direction. We called the device Optical Needle Guide (ONG). Using the simulator and ONG, we checked proficiency in the ultrasound-guided CVC skill of the trainees at pre-training and post-training.

**Results:** Forty-two trainees were recorded. Post-training success rate was increased from 81.0% to 92.9% without ONG, and increased to 100% with ONG. Position aberration of the needle tip from the vessel center was decrease significantly with ONG. Identification of the needle tip on the ultrasound image also became more certain significantly after the training with ONG

**Discussion & Conclusion:** By using the simulators which made the needle tip in the vessel visible, we could evaluate venipuncture skills of the trainees objectively. The simulators made by 3D printer can change the difficulty for vascular puncture, provide different levels training. We expect that using the training system with ONG and the simulators of different difficulty levels increases effectiveness of the CVC training, and contributes patient safety.

## Funding

This research was supported by AMED under Grant Number JP15km0908001

## P016

### To lock or to lok: Comparing the two suture-less fixation devices

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**Introduction:** Suture-less fixation offers numerous advantages over suture fixation and is recommended by CDC (1). In our ICU all the upper extremity arterial lines are secured suture-free (StatLock, Bard, USA) as for femoral approach, fixation is at the discretion of the attending physician or catheter-nurse assisting the procedure. Subclavian and internal jugular venous catheters are predominantly secured with StatLock while femoral approach (arterial and venous) is mostly secured with sutures.

**Methods:** In single center, randomized study we compared 2 suture-less devices: StatLock (Bard, USA) and comparator, Grip-Lok (Vygon, FR) for arterial and central line fixation.

**Results:** After training with comparator device, 98 dressing in each group were applied and removed (40 for central lines and 58 for arterial lines). There was no inadvertent central venous line removal in any of groups nor indication for premature catheter removal due to infection. No allergy to greasing, difficulties with application and/or removal of suture-less devices was observed. 3 radial arterial catheters were prematurely removed due to kniking (2 in StatLock

and 1 in GripLok; NS). AVA and MAC catheters were secured with GripLok only.

**Discussion:** Both systems offer adequate and comparable securement safety, GripLok being securement of choice for AVA and MAC fixation since StatLock for those catheters is not available. Stat-Lock was superior in central venous fixation regarding nursing, while GripLok for upper arterial fixation.

**Conclusion:** StatLock and Grip-Lok are comparable in securing central and arterial lines. The choice of the devices should rely on familiarity of the product. For possible differences between products regarding additional infection prevention, patient satisfaction, and long term use, further trials are needed.

## References

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## P017

### ECG navigation – Always exact? Case report

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**Introduction:** Multiple factors can cause difficulties with PICC-port insertion and the right tip position is in rare cases difficult to access, as shown in our case-report.

**Case presentation:** 38-year old obese (BMI 33) female with metastatic ovarian cancer (peritoneal carcinomatosis, lung and pleural metastases) requiring intravenous chemotherapy had her single lumen 5F PICC-port line placed via the left vena basilica. During the procedure using ECG navigation, P-wave elevation was shown indicating the position of the end of the catheter in the cavo-atrial junction. PICC- PORT was placed without problems and treated according to the standard. Control chest X-ray, badly readable for obesity and large breasts, after first reading described the position of the catheter in the right atrium. The position of the catheter was subsequently modified, catheter was pulled-out by 5 cm and properly fixed. Second chest X-ray, after correction, showed the tip position of the catheter without any change. Detailed analysis of the 1<sup>st</sup> X-ray image showed the exact position of the PICC tip deeply in the right atrium, creating a loop, with the position of the catheter tip at the entrance to the right atrium. Therefore, the presence of P-wave elevation on intra-cardiac ECG was present. The end of the catheter was seen on the echocardiography in the right atrium touching the right tricuspidal valve, influencing the movement of the valve. Because of this malposition, the line was extracted, without any complications.

**Discussion:** There are some hypotheses that body habitus (obesity or large breasts) can contribute to tip migration and increase the risk of malpositioning. The literature

review also revealed that although ECG navigation and plain chest X-ray are standard modalities for confirming tip location, in some cases, additional diagnostic methods to confirm or rule out catheter tip malposition should be used.

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## P018

### Complicated PICC extraction due to adherent fibroblastic sleeve

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**Introduction :** Peripherally inserted central catheter (PICC) is very convenient type of central venous access in cancer patients for intravenous medication administration (chemotherapy), as long as for supportive care (antibiotics, hydration and parenteral nutrition). Multiple factors can cause difficult PICC removal including thrombus formation (especially in cancer patients) or adherent fibroblastic sleeve.

**Case presentation:** 51-year old male with metastatic oropharyngeal carcinoma (initial stage T4N3M1) with tracheostomy, requiring intravenous chemotherapy administration had his single lumen 4F PICC line placed via the right vena brachialis in august 2016. After five months, in january 2017, he presented with upper limb swelling and pain in his right arm. Doppler ultrasonography demonstrated thrombus alongside the length of the PICC line, thrombus was also adherent to the vascular wall. This complication was successfully treated with low molecular weight heparin in therapeutic dosage. The PICC line was placed for 16 months and was fully functional the whole time. After completion of the treatment, in december 2017, the planned extraction was performed. The PICC could not be removed by standard technique. X-ray showed the tip of catheter positioned in cavoatrial junction. Because of the risk of vascular damage (superior vena cava dissection) with extensive bleeding, we preferred the cooperation with an interventional cardiologist. Using fluoroscopy, we introduced the guiding wire into the lumen of the catheter and slowly and cautiously removed the catheter without damaging the integrity of the PICC line and without vascular damage.

**Discussion:** The pathologist evaluated the tip of the PICC catheter and found a fibroblastic sleeve mixed with platelets. We supposed the fibroblastic sleeve was adherent to the endothelium. The cause of this was probably the thrombosis and the time from catheter insertion. There is a

question- does the longer time from implantation influence the adherence of PICC tip to the endotel ?

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### P019

#### Ultrasound-guided method for repositioning a misplaced guidewire during subclavian catheterization

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**Introduction:** During subclavian vein catheterization, one of the most common misplacement of the catheter is into the ipsilateral internal jugular vein (IJV). The incidence of the catheter positioning in the ipsilateral IJV via the subclavian vein (SCV) catheterization is about 9,3%<sup>(1)</sup>. We describe an ultrasound-guided method for repositioning misplaced guidewire during SCV catheterization in adults.

**Method:** When using ultrasound guidance with a linear probe and the tip of the guidewire is detected in the ipsilateral IJV, the guidewire is repositioned into the brachiocephalic vein (BCV) as follows: the probe is positioned on the neck to obtain a longitudinal scan of the IJV which is then followed caudally up to the clavicle, then is tilted up to visualize the junction between the IJV and the SCV where the BCV starts. Under ultrasound guidance, carefully withdraw the guidewire until the J-tip is in the SCV between the clavicle and the junction of the IJV and the SCV, then rotate until the J-tip is pointing down and then advancing towards the BCV. Occasionally, compression of the ipsilateral IJV can be helpful. If the guidewire does not thread into the BCV, the above method may be repeated.

**Results:** Until now, we have correctly repositioned the not properly positioned catheter using ultrasonography in more than 50 cases without failure and complications.

**Conclusion:** This method is simple, safe and it can be repeat few times in the same patient until the position of the tip goes down in the BCV.

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### P020

#### Medication-preparation and administration errors in an oncology hospital: A direct observation study

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**Introduction:** Despite efforts intended to improve patient safety, medication errors persist globally. Errors in preparing and administering medications are caused by healthcare professionals and constitute preventable events that may generate serious patients harm. Intravenous (IV)-associated medication errors are especially dangerous, whereas adverse outcomes can be more severe when compared with other administration's routes. Objectives: Identify the main errors in the preparation and administration of IV medications made by the nursing staff of an Oncology hospital in Southern Brazil.

**Method:** An exploratory-descriptive study was conducted at Santa Casa de Misericórdia Hospital de Porto Alegre, Brazil, between February to May 2017. A direct observational technique was used to collect data from nurse medication rounds through a standard observation tool. A nurse observer, member of the Vascular Access and Infusion Therapy Team, followed the nursing staff for the duration of the medication round, watching the preparation and administration of each dose, and recording details of errors that were executed. After the observation, the professional was promptly educated to correct the errors and to emphasize best practices.

**Results:** Six (4%) nurses and 147 (96%) licensed practical nurses were examined during the study. 173 IV medications/solutions were observed. The mistakes made in the preparation of medications were: failure to verify medical prescription (91,2%), e.g., patient's full name, medication's name, posology, dose, time of administration; failure to clean the bench before preparing medications (66,5%); failure to disinfect the vial/ampoules before opening (48,2%); use of wrong medication reconstitution (70%) and dilution (39,3%). Regarding the failures related to medication administration, the most frequent were: patient identification was not verified in 93%; failure to disinfect catheter connectors before access (43,4%) and speed of incorrect infusion (85%).

**Discussion & Conclusion:** Results point to the need for ongoing education of nursing staff and interdisciplinary strategies for preventing IV-associated medication errors.

### P021

#### The perceived value of the IV TEAM assistance, management and educational activity: Results of a hospitalist survey

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**Introduction:** Since the Intravenous Therapy Team (IV Team) creation the use of peripherally inserted central catheters (PICCs) and Midline are growing and its use has been incorporated in new clinical areas.

This expanding in its use is associated with a higher rate of complications like thrombosis or infection. Moreover, some PICCs may not be placed for clinically valid reasons.

IV Team results key for defining appropriate indications for catheter insertion and maintenance as major endpoints for patient safety.

**Method:** We elaborated a survey addressed to hospitalization nurses attending patients with Midline or PICCs. Survey evaluated 12 items related to IV Team procedures, material resources and algorithms available for management of catheter-related complications.

**Results:** 115 nurses from 18 different units of the hospital completed the questionnaire. Professionals surveyed felt very confident with the IV Team. They highlighted the Midline as an especially useful device in poor peripheral venous access. All algorithm were appreciated for improve clinical practice, resulting as the most valued the central line associated bloodstream infection protocol.

**Discussion & Conclusion:** IV Team engagement with all the rest of clinical units in the hospital is increasingly widest and its contribution in the safety of patients with catheters is fully recognized.

Nurses attending this population demand the implication of the IV Team in the daily management of these devices, especially after the implantation for the attention of possible subsequent complications.

The selection of appropriate catheter should take in account patients or venous access characteristics and nature, duration and properties of the infusate.

Algorithms for management of catheter-related complications has been adequately validated and implemented by the scientific community. The perception of its usefulness in the real world daily practice as a critical tool to preventing costly and potentially fatal adverse events has been endorsed in our project.

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## P022

### Success rate of bedside PICC placement and characteristics of its tip position in single institution

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**Introduction:** This study was conducted to evaluate the incidence and risk factors of tip malposition after performing bedside PICC.

**Method:** This is a retrospective study from prospectively registered database from patients who underwent PICC placement from Jan 2013 to September 2014. Success rate of bedside PICC, clinical characteristics of tip position after bedside PICC placement and risk factors of tip malposition was analyzed.

**Results:** Overall success rate of venous access in bedside PICC placement was 97.1% (1289/1327). The success rate of venous access was 98.6% (868/880) with ultrasound guidance and 97.1% (434/447) with blind approach, respectively. The proper tip position was ascertained in 1231 (94.5%) after first attempt. The repositioning of PICC was tried in 71 patients. 47 PICCs were repositioned at the bedside and 2 PICCs were repositioned under fluoroscopic guide. 3 PICCs were naturally moved to the desired position without intervention. 8 PICCs were used as a midline catheter and 11 PICC catheters were removed. The risk factors of tip malposition were higher age ( $p < 0.001$ ), catheter type ( $p < 0.001$ ) and presence of cancer ( $p = 0.037$ ) or lung disease ( $p < 0.001$ ).

**Conclusion:** Bedside PICC is effective and safe methods for CVC with high success rate. To improve success rate of bedside PICC placement, ultrasound guidance is recommended. Old age, cancer and pulmonary disease were significant risk factors of catheter tip malposition.

## P023

### Effective vascular access for breast cancer chemotherapy according to patient's clinical characteristics

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**Background:** Peripheral intravenous chemotherapy can cause thrombophlebitis for affected arm. Central vascular access for chemotherapy can avoid thrombophlebitis and Various methods are available in clinical practice. Authors tried to evaluate effectiveness of chemoport and Peripheral Inserted Central Catheterization(PICC) for breast cancer chemotherapy.

**Method:** This is a retrospective study from prospectively registered data base for the breast cancers patients, who underwent PICC or chemoport insertion from April 2015 to December 2015 in Seoul ST. Mary's hospital in vascular and transplant surgery. Modalities for vascular access were decided depending on duration of chemotherapy and patient' clinical characteristics. PICC was inserted in the opposite basilic vein from breast cancer site. Chemoport

was inserted in opposite jugular vein from breast cancer site. Patient's clinical characteristics were evaluated with EMR and PACS.

**Results:** One hundred ninety two patients were enrolled for this study (84 patients for PICC and 108 patients for chemoport). PICC was inserted for breast cancer chemotherapy less than 4 months and chemoport more than 4 months. There was no mortality related to vascular access for breast cancer chemotherapy. Vascular access was removed earlier than end of scheduled chemotherapy in 7.3% (14/192) (9.5% in PICC (8/84), 5.5% in chemoport (6/108)). The reasons for early removal of vascular access were catheter insertion site (7) and incidental removal (1) in PICC group, infection (2) and painful erythema and chemical irritation along catheter (4) in chemoport group. Other complications included malfunctions (4), pain (2), central vein thrombosis (1), thrombophlebitis (6) and non removal of chemoport after end of chemotherapy (3).

**Conclusion:** PICC and chemoport for breast cancer chemotherapy can be used in 92.7% until end of chemotherapy without serious complications. They are effective method with reasonable complications.

## P024

### The need of teaching empathy to healthcare providers: Why and how

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**Introduction:** Patient-centred attitude is a concept taking place nowadays in our daily practice. The human factor makes really a difference when a patient is treated due to a health problema but this aspect (including empathy, compassion, active listening) is not always part of the university programs for healthcare professionals. Wit this paper authors want to underline the importance of emotional intelligence in the clinical practice and to offer an overview of different educational options for this goal.

**Method:** Review of the litterature from 2016 to february 2018 has been conducted. Key words for the research have been "empathy", "compassion", "satisfaction", "quality of life". A total of 71 papers were found. Only 29 of those took under consideration educational options to teach these skills.

**Results:** studies reviewd demonstrate the lack teaching emotional skills during the university years. In many cases, students themselves find that this subject is necessary for the practice.

**Discussion & Conclusion:** The health care professional curricula needs to implement this necessary subject. Most of the clinicians and nurses acquire or develop their skills when they are already working. This contributes to increases rates of stress, burnout syndrome, fatigue and conflictive

situations with colleagues and patients. Some educational options are on the table: writing and poetry, mindfulness-based stress reduction, group sessions, volunteer activities and mentorship, as example. Authors believe that this issue needs to be faced by the scientific community in order to improve the health care quality, patients' satisfaction and experience with the healthcare team. In authors' opinion, academic education should be provided to all staff working in healthcare if we really want the patients to be in first place.

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## P025

### Establishment of a Finnish vascular access team

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**Introduction:** Limiting the number of healthcare professionals who perform vascular catheterizations has many benefits. In Finland physicians have traditionally been responsible for inserting central venous catheters and managing difficult vascular access (VA). In 2015 at Peijas Hospital (part of Helsinki University Central Hospital) we started the first Finnish VA team where one nurse was educated to insert midline catheters and peripherally inserted central catheters (PICCs). The objective was to concentrate majority of catheterizations to this nurse and one anesthesiologist and thus improve patient care and reduce costs. Another nurse joined the established VA team in 2017.

**Method:** The education process of VA nurses was similar for both nurses. They had background as experienced anesthesia nurses. Both got theoretical and hands-on education from a commercial collaborator, Peijas hospital anesthesiologists and a sonographer. Self-studying of guidelines and recommendations was

required as well as inserting multiple midline catheters and PICCs under guidance of anesthesiologists. Finally, there was a PICC insertion demonstration for VA team anesthesiologist.

**Results:** VA nurses are now working independently under supervision of VA anesthesiologist. In 2015 VA team inserted 37 PICCs (24% of all PICCs), next year 97 PICCs (60 %) and in 2017 total of 148 PICCs (54 %). In 2017 the mean time for PICC insertion was 25 minutes for VA nurses and 48 minutes for anesthesiologists. No midline catheter or PICC related bloodstream infections have been reported since 2013.

**Discussion & conclusions:** Benefits of having a VA team in our hospital have been recognized. In addition to inserting catheters the team has many other tasks like screening patients for catheter related venous thrombosis and catheter displacement and treating occluded PICCs. However, since Peijas is a teaching hospital it is impossible to concentrate all peripheral catheterizations to VA team.

## P026

### Experience report after implantation of a team of nurses dedicated to the insertion of PICC

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Intravenous therapy is considered in the world as an important therapeutic resource and is indicated for most hospitalized patients. In view of the need to indicate treatment by intravenous route and concerned about the quality of care for patients due to the risks of adverse events, we decided to create a group of nurses dedicated to the insertion of PICC.

**Methods:** This is a quantitative retrospective study from the year 2017.

**Results:** A total of 760 central venous catheters were inserted, 77% of which were double lumen and 23% of triple lumen, representing an average of 63 catheters per month. Of the total of inserted catheters 79% were inserted in the intensive care unit, 20% in the non-critical unit, only 1% in the other units. All punctures were guided by usg and had the following puncture rates: first puncture was 86%, second puncture 8%, third puncture 3%, limiting to five punctures 1.22%, and failure rate was also of 1.22%. In 98% of the catheters inserted the vein of first choice was the basilic vein, 1% cephalic and 1% axillary. The rate of bloodstream infection related to picc was 0.65% in the study period. The mean permanence of the inserted catheters was 12.52 days. The mean time for events that required withdrawal of the catheter was 13.1 days. After the composition of the team, we observed a 39% increase of inserted catheters compared to the year

2016. The accidental losses by exteriorization of the catheters totaled 04 in the period. The cases of VTE had an average rate of 2.67%.

**Conclusion:** the performance of a team of qualified nurses dedicated to the insertion of PICC catheters was extremely important to reach the technical quality in the procedures performed, thus ensuring a safe care for hospitalized patients.

## P027

### Evaluating PICCs v/s CVCs for Neuro Trauma ICU patients

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**Introduction:** Neuro Trauma ICU patients differ from the patients in other ICU since they have polytrauma, multiple co-morbidities & have prolonged ICU stays. Veins of these patients are lifelines in ICU. Multiple medications/fluids, invasive hemodynamic monitoring, frequent blood sampling & extended vascular access is critically required in these patients. Thus choosing the right CVAD is critical for better patient outcomes.

**Objective:** Evaluating Central Venous Catheters (CVC) v/ contrast enabled PICC lines.

**Results:** CVCs have high incidence of mechanical complications (5-19%) which includes pneumothorax, haemothorax, arterial puncture, hemoatoma and air embolus. Due to their site of insertion, they are not appropriate in all patient care setting and increases patient discomfort. PICCs on the other hand have no risk of pleura-pulmonary damage and no clinically significant risk of local hemorrhage or hemotoma. PICCs are usually inserted at medial cubital or basilic veins, thus increasing patient comfort. High flow rates, reliable hemodynamic monitoring & support for CT contrast are also provided by PICCs. Total of 136 PICCs have been placed b/w Jan-Dec 2017.

**Conclusions:** PICCs are associated with a lower incidence of CRBSI rate of infection v/s CVC, since the exit site that is less prone to contamination. CLABSI rates at neuro trauma ICU are at 1.36 incidences/insertion v/s 3.1 incidences/insertion at other ICUs in hospital. Incidences of venous stenosis with PICCs are at 1.96% which is well below documented publication. .

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**P028****Case Report: PICC line with silver sulfadiazine dressing in allergy**

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Peripherally inserted central catheter has been widespread between venous access devices. Studies have shown that the vascular access nurse team, have contributed to decrease complications and bloodstream infection. The major challenge for most institutions is to ensure proper maintenance of these devices and keep the patency until the end of the therapy.

This case report was performed last December in a private hospital with focus in cardiology and oncology located in São Paulo, Brazil. We performed care for patients going home with the PICC line and some patients didn't adapt with the dressing impregnated with chlorhexidine.

This study is a case report of a 45-year old patient diagnosed with Hodgkin's lymphoma requiring a safe route for administration of chemotherapy and sedation during radiotherapy. The patient was with a 6 Fr triple lumen power injectable tip catheter in the left arm; however, this patient cannot have adhesives used in direct contact to the skin, after one week the patient presented an allergy to the dressing impregnated with chlorhexidine. (Annex 1), was performed dressing with silver sulphadiazine (Annex 2), and after ten days of patient's catheter was stable, without bleeding in catheter and the dressing was intact. (Annex 3). The power injectable peripherally inserted central catheter is a safe route for chemotherapy administration in patients it reduced discomfort and pain patients in chemotherapy. It is a safe alternative for patients in critical care.

**P029****Implementation and evaluation of a skills training program for ultrasound-guided vascular access in small vessels using a low-cost cadaver tissue model**M. Wagner<sup>1</sup>, K. Hauser<sup>1</sup>, F. Cardona<sup>1</sup>, G.M. Schmölder<sup>2</sup>, A. Berger<sup>1</sup>, M. Olischar<sup>1</sup>, T. Werther<sup>1</sup><sup>1</sup>Medical University of Vienna, VIENNA, Austria<sup>2</sup>University of Alberta, EDMONTON, Canada

**Introduction:** Central venous access in infants and children treated in trauma centers and in neonatal and pediatric intensive care units is often required and difficult to obtain. Real-time ultrasound guidance for central venous catheterization (CVC) is considered one of the patient safety practices with strong evidence. Since the diameter of central veins in infants is much smaller than in adults, visualization and puncture of central veins require extensive training in this patient population.

**Method:** The purpose of this study was to assess the learning effect of a skills training program on ultrasound-guided cannulation in a low-cost cadaver tissue model. In this prospective simulation-based study, we assessed the procedural competence of US-guided CVC in a low-cost cadaver tissue model using a before-after design. To assess the training program, we used a questionnaire and a performance checklist. Each participant attempted an ultrasound-guided puncture and insertion of a guide-wire in a small (two mm) and a large (four mm) tube using the in-plane and out-of-plane technique before and after a standardized teaching course.

**Results:** Thirty-nine physicians participated in this study. There was a statistically significant reduction in failed attempts in the two mm vessels (in-plane:  $p=0.001$ ; out-of-plane:  $p=0.004$ ) after the initial training and teaching. No statistically significant difference was found in the four mm vessels (in-plane:  $p=0.148$ , out-of-plane:  $p=0.069$ ). The number of successful cannulations on the first attempt increased after teaching in all methods ( $p=0.001$ ).

**Discussion & Conclusion:** The implementation of a skills training for CVC in a cadaver tissue model was feasible and little time- and money-consuming. We were able to show a significantly decreased number of attempts until successful cannulation in the small vessel with an internal diameter of two mm after the standardized teaching session.

**P033****Impact of an intravenous therapy team on vascular care and satisfaction of patients with multimorbidity**V. Armenteros-Yeguas<sup>1</sup>, M.A. Tomás-López<sup>1</sup>, E. Cristóbal-Domínguez<sup>1</sup>, M.I. Moraza-Dulanto<sup>1</sup>, L. Gárate-Echenique<sup>2</sup>, L. Meléndez-Fernández<sup>3</sup>, E. Merino-Romero<sup>1</sup>, E. Miranda-Serrano<sup>1</sup><sup>1</sup>Bioaraba Research Institute, Araba IHO (Integrated Health Organization), VITORIA-GASTEIZ, Spain<sup>2</sup>Donostialdea IHO (Integrated Health Organization), DONOSTIA, Spain<sup>3</sup>Santa Marina Hospital, BILBAO, Spain

**Introduction:** The aim of this study is to evaluate the effectiveness of an intravenous therapy team (ITT) in relation to vascular care safety and satisfaction in multimorbid patients.

**Method:** Quasi-experimental design study was conducted (December 2013-May 2015) in two hospitals of Spain. The target population were patients with multimorbidity, admitted to hospital. After signing the informed consent, control and experimental group were established. In the control group, vascular care was provide by staff nurses of the units. In the experimental group, ITT provided vascular care as soon as it was available. The main variable was 'safety of vascular care' and was measured by collecting data about presence of difficult venous access, number/kind of vascular access devices (VAD), locations, number of attempts, average duration and number of adverse

events, among others. Demographic and patient satisfaction data were collected. Absolute frequencies, percentages, means, standard deviation and relative rates per 1000 days of treatment were calculated. Chi-square, Mann-Whitney U tests and incidence rate comparisons were performed to compare the groups.

**Results:** The sample was 52 patients, 26 in each group. As the ITT was not available 24 hours-a-day, there was a delay time of 2.6 days (SD: 1.8). 123 VAD were inserted, 51 in the control group and 72 in the experimental group (43 inserted during the delay time and 29 by ITT) ( $p < 0.001$ ). 24% and 15% of the VAD were inappropriate to the prescribed therapy ( $p = 0.02$ ) and the incidence of adverse events were 41.2% and 30.6%, respectively ( $p = 0.003$ ). The average satisfaction was 7.78 (SD: 0.89) for control group and 8.76 (SD: 1.38) for the intervention group ( $p = 0.015$ ).

**Discussion & Conclusion:** ITT provided more safety in relation to adequacy to the prescribed therapy and incidence of adverse events. Delay time influenced the intervention group negatively in relation to number of VAD.

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### P034

#### **An investigation into the reliability of Actilyse Cathflo in restoring patency to occluded peripherally inserted central catheters and implementing a new guideline**

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**Introduction:** Percutaneous Inserted Central Catheters (PICCs) are commonly used devices for IV Therapy administration and Blood sampling. A common complication is catheter occlusion. A reliable way to restore patency is to lock a solution of Actilyse into the occluded catheter lumen.

**Method:** An investigate into how affective Actilyse Cathflo was in restoring IV catheter patency, including length of time to achieve patency and number of attempts made was undertaken at a large Acute hospital in the United Kingdom over a 6 month period in 2017.

The investigation looked at patients of all ages with PICCs and implanted intravenous ports. The investigation also examined the best technique for locking the Actilyse into

the occluded catheter which depended on the nature of the occlusion. Bolus push, pop and 3 way tap technique were all used in various cases.

**Results:** An attempt was made to unblock 25 PICCs and 1 PORT using 2mg Actilyse CathFlo in each occluded lumen.

77% of catheters were unblocked with the first lock of Actilyse CathFlo, 15% were unblocked with a second lock of Actilyse CathFlo and 8% were unable to be unblocked at all.

The average time it took to unblock the catheter on the first lock was 45 minuets

The average time to regain patently after the second lock was 90 mins.

**Discussion & Conclusion:** Actilyse Cathflo is an easy and effective way to unblock occluded central catheters and the 3 way tap technique seems to be the most effective, safe way to lock the solution into the catheter lumen. Most occlusions happened in catheters that where in use but had, at some point, had blood taken out of the catheter lumen for sampling

### P035

#### **Impact of the implementation of the best practice guideline: 'Assessment and devices selection for vascular access'. knowledge transference strategy**

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**Introduction:** The BPSO (Best Practice Spotlight Organization) project consists in implementing, evaluating and maintaining the Registered Nurses' Association of Ontario (RNAO) best practice guidelines (BPG), with the aim to transfer knowledge into practice, to create an international network of health centers committed with quality of nursing care, and to promote an evidence based culture on care. In Spain, the project is supported by Instituto de Salud Carlos III (Investen) and the Spanish Collaborating Center of Joanna Briggs Institute.

**Objectives:** To present the documents generated as a result of the implementation of the BPG.

To describe the scientific publications derived from the project.

To find out the reasons for participating in the project and the satisfaction level of the project stakeholders.

**Method:** Design: descriptive prospective study starting on January 2015 until December 2017 in a second level Hospital with 142 beds.

A data collection sheet was designed in order to collect data on: protocols, algorithms and flowcharts, and registers, this last ones being registered on line on the intranet.

Reasons for participating in the project and satisfaction were assessed by an online questionnaire.

**Results:** During the study period were developed: 5 nursing care protocols, 1 system web-based tool to register vascular access, 2 algorithms/flowcharts, 1 mobile App, and an intravenous drugs list (with pH and osmolarity). Eight posters and 6 oral communications were presented in scientific congresses, and 1 scientific video won the first prize in a National Congress. Main reasons for participating were: improving care and having the opportunity to participate in research.

**Discussion and Conclusion:** The implementation has had a positive impact in our Hospital, including the spreading of the knowledge for an evidence based good clinical practice and training opportunities in the field. This has to improve the quality of care.

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## P036

### A Cochrane Review. Vascular access specialist teams for device insertion and prevention of failure

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**Review:** Most people admitted to hospitals worldwide require a vascular access device (VAD). Numerous reports suggest a team approach for the assessment, insertion and maintenance of VADs improves clinical outcomes, the patient experience and healthcare processes.

We reviewed the evidence about the effectiveness of Vascular Access Specialist Team (VAST) compared with generalist models with regard to device insertion and prevention of failure and cost-effectiveness. We did not find any eligible studies for our review.

**Methods:** We describe a VAST as the grouping of healthcare personnel specifically associated with VAD insertion and care. We included the following as descriptions of VAST; infusion teams, intravenous teams, or intravenous

therapy teams as well as individual vascular access specialists (nurse, doctor, therapist, technician, and physician assistant) who have formalised advanced knowledge and skills and who frequently insert or manage (or both) VADs. We wanted to evaluate if the VAST approach is superior to a generalist approach.

We searched the databases in February 2018. We located 2398 potential studies. We reviewed 30 studies. We found one suitable study, but it has not yet been published so it was placed in the classification pending table. We found one registered trial investigating our review question that is still in progress.

**Results:** This review failed to locate published randomised controlled trials (RCTs) to support or refute the assertion that vascular access specialist teams for device insertion and prevention of failure are superior to the generalist model. However, this conclusion might change once the study awaiting classification and the ongoing study are published. There is a need for good quality RCTs to evaluate the efficacy of a VAST approach for VAD insertion and prevention of failure.

**Quality of evidence:** We did not analyse the quality of evidence as we did not find any suitable studies to include in our review.

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## P037

### Optimal venous access in the Czech Republic and Slovakia – Situation in 2017

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**Introduction:** The choice of optimal mid-term and long-term venous access depends on the availability of the appropriate venous devices (including midline, PICC, tunneled CVC or TIVAD), their correct insertion technique with ultrasound/ECG or fluoroscopy navigation and on teamwork – vascular access centers, PICC teams.

**Methods:** All Czech and Slovakian hospitals with established vascular access services were surveyed. Total

number of inserted midline catheters, PICCs, tunneled CVCs and TIVADs was recorded including complication rates during 2017 period.

**Results:** In total, seven hospitals have been identified in which all venous devices are inserted using ultrasound and ECG or fluoroscopy navigation. The total number of implanted venous devices in these hospitals was as follows: midline catheters 1495, PICCs 1597, tunneled CVCs 163, TIVADs 1844, grand total 5099 devices. The only complication associated with midline and PICC insertion was inability to introduce the catheter - midline in 50 patients (3.4%) and PICC in 30 patients (1.9%). Twenty-seven complications (1.5%) were recorded in insertion of tunneled CVCs and TIVADs - five pneumothoraces, eleven haematomas, five arterial punctures, one early infection and five unsuccessful implantations of TIVAD. PICC teams were active in all aforementioned hospitals, and in two of them a complex venous access team with 24/7 service was established. Other centers in the Czech Republic and Slovakia also offer insertion of venous devices but they do not follow the bundle for an optimal venous access.

**Conclusion:** There were only seven hospitals offering an appropriate selection and insertion of an optimal venous access in the Czech Republic and Slovakia during 2017 period. Total number of patients receiving PICC and TIVAD is not fully satisfactory so far. Complication rate is on the contrary quite acceptable mainly due to routine ultrasound use and ECG or fluoroscopy navigation.

## P038

### Intravenous therapy unit: A reality

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**Introduction:** “Complejo Hospitalario de Navarra” is a 1100-bed hospital located in the North of Spain in the province of Navarra. For years there is a major interest of nursing professionals to advance in the field of vascular access, but it is not until 2015 when this hospital features project BPSO © deciding to implement the guide “Care and maintenance of the vascular access to reduce complications”. Due to this being promoted various changes in the Organization, which have allowed to implement the recommendations of this guide, thus establishing the Committee of multidisciplinary experts in intravenous therapy, giving support to the professionals of the hospital in matter of vascular access working, among other issues, the management of the major complications of central catheters peripheral inclusion (PICC).

**Methodology:** Establishing intravenous therapy unit thanks to a grant from intensification provided by a private entity which begins January 2018 and will have duration of nine months, during which, an advanced practice nurse will be of exclusively to the implementation and management of central catheters of peripheral insertion (PICC). During this period, all the catheters managed by the nurse will be monitored in order to be able to carry out a subsequent cost-benefit analysis of the same.

**Results:** The inclusion of PICC ecoguided for nursing is a technique that has shown great benefits. Preliminary results from the first three months of the period of investigation will be presented.

**Discussion/conclusions:** The implementation of a unit of intravenous therapy, involves a cost savings for the organization, both in material resources as human, a benefit for patients while preserving its venous capital and a benefit for the professionals ensuring a vascular access fast and secure.

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## P039

### Consensus for paediatric CVAD management. It's happening

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There is a plethora of evidence and recommendations for Central Venous Access Device (CVAD) insertion however significant gaps exist for the diverse range of maintenance practices. These gaps are often informed by ‘the way we’ve always done it’, manufacturer recommendations or clinician opinion. The lack of consensus and variation in practices leads to poor vascular access outcomes. The paediatric patient population is a high risk and vulnerable patient cohort. A collaborative, multi-site project commenced in 2017 with two major paediatric hospitals to work towards achieving consensus for the management of all types of CVADs, preterm to 18 year olds, across all

clinical areas. This project encompasses the entire CVAD journey, from device selection, insertion, maintenance practices through to removal, with the goal to reduce variability in practice, reduce all types of CVAD-related complications and improve patient outcomes.

A gap analysis between evidence derived from an extensive literature review and thorough scoping of current CVAD management in both hospitals was completed. Standardisation and operationalization of current evidence informed an extensive list of service improvement recommendations endorsed by both Health Services.

Recommendations are grouped under six themes; 1) practices, 2) products, 3) processes, 4) hospital procedural documentation, 5) data / reporting, and 6) education. Implementation of the recommendations has commenced. A central repository has been established to provide monthly analysis of all common paediatric CVAD complications. Existing documentation has been updated and the first of three CVAD bundles has been introduced.

Variation in CVAD management between clinicians, departments and health services increases the risk of poor vascular outcomes. Consensus and consistency with current evidence is pivotal to positively impact vascular access outcomes. This project will establish and implement an evidence-based, systematic and consistent approach to ensure safe, high quality device management for paediatrics receiving care at the two paediatric hospitals.

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## P040

### Risk factors for peripheral intravenous puncture in ill children: Systematic review

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**Introduction:** Multiple attempts to peripheral intravenous puncturing cause distress to the child, injury to treatment and risk of complications occurrences. The purpose of this study was to verify in the literature the main risk factors that can cause multiple procedures.

**Method:** Systematic integrative review performed in three indexed databases, used as descriptors pediatric nursing and peripheral intravenous catheterization for online bibliographic search. The inclusion criterions were: articles published in English, Spanish or Portuguese language;

title, abstract and content that addressed the risk factors for peripheral intravenous puncture in ill children. The primary search resulted 12 studies. A secondary search was performed in the citations identified in the selected articles and more 10 researches were included. The final sample was composed for 22 studies. The time was not limited.

**Results:** The researches were performed between 1999 and 2017. The studies design were 40.9% randomized controlled, 31.9% cohorts, 13.6% observational, 9.1% experimental almost and 4.5% systematic review. The risk factors for the multiple attempts found were age (history of prematurity and age < 3 years), skin color (skin dark), obesity, clinical history (chronic diseases, sepsis and dehydration), physical exam of veins (vessels difficult do see and not palpable), history of multiple punctures and complications related to intravenous therapy.

**Discussion & Conclusion:** The researches showed that premature children, with age < 3 years, obese, with skin dark, dehydrated, with sepsis, that have chronic diseases, vessel difficult to see and not palpable whit history of multiple puncture can be punctured multiple times. Thus, it is important knew the risk factors for puncture ill children to facilitate planning of the care of the intravenous therapy and reduce the multiple attempts and yours consequences. This systematic integrative review will allow the building of the guidelines for the peripheral intravenous catheterization of the ill children.

## P041

### Prospective audit to study urokinase use to restore patency in occluded central venous catheters in haematology and oncology patients – Interim results from a multicentre study (passport study)

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**Introduction:** CVAD patency is essential for intravenous access in the treatment of haematology and oncology patients. CVAD dysfunction often associated with thrombosis is defined as a) the inability to administer treatments due to total occlusive (TO) or b) Persistent Withdrawal Occlusion (PWO). Early intervention with thrombolytic agents is imperative to maintain CVAD patency in order to avoid disruption of life saving treatments. SynerKINASE (urokinase) is one of the most widely used thrombolytic agents for CVAD occlusion; there is need to standardise urokinase protocols for this indication.

**Method:** A small multidisciplinary focus group from different centres in the UK was formed to conduct a prospective audit of the management suspected occlusion of CVAD using standardised urokinase dose algorithms from

September 2017 to February 2018. Centres that use urokinase as a thrombolytic agent participated in the audit. Audit data was collected anonymously using a web based platform. Urokinase doses administered ranged between 5000IU – 25000IU. This was the first time the high dose of 25000IU urokinase has been administered for thrombolysis of haematology/oncology CVAD. Additional thrombolysis of CVAD was performed if first dose administration was unsuccessful, full data analysis to show outcomes is awaited.

**Results:** n=117, 54 females (46%) and 63 males (54%), median age was 60 (46-68). From the first treatment with urokinase, out of 53 CVAD with TO patency was restored in 46 (87%) and out of 64 CVAD with POW patency was restored in 80%. The CVAD clearance rate was dose dependent, 82% with 5000IU, 100% with 10000IU and 90% with 25000. No adverse events were recorded in this audit.

**Discussion/Conclusion:** In this prospective audit treatment of occluded CVAD using standardised urokinase dose regimens was safe and effective in restoring patency of CVAD. Further analysis from this study will be carried out as longer follow up data is obtained.

## P042

### **There may be more than meets the eye: Tip location depends also of port's capsule position and shoulder and arm motions**

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**Introduction:** From literature review, tip location is clearly thrombosis-related when shallow and arrhythmias-related when deep. Intra-operative fluoroscopy or intracavitary ECG are the gold standard of adequate tip location. In real life, one's certainly minimize the actual movement of intravascular portion of implanted catheter. From literature, the factors associated with increased catheter tip movement include patient age, BMI, innominate vein angle and larger superior vena cava, short height and longer implanted catheter length.

**Methods:** We report the case of an 8 year-old boy (W=27 Kg, H=1.30 m) who received right jugular intern port implantation for chemotherapy, under intra-operative fluoroscopy. Tip location was at the junction superior vena cava-right atrium visualized in chest plain film. 3 months later, we are urgently alerted by the oncologist to quickly remove this catheter which is in the left hepatic vein (emergency call from a radiologist during a CT scan).

**Results:** a control chest ray, arms alongside the body and not placed above the head showed again an adequate tip location. The difference of tip location between both arms position was more than 4 cms.

**Conclusion and discussion:** we are about to conduct a prospective study to evaluate the role of arm, shoulder and capsule location in the mobility of intravascular catheter. Arms position must be checked before falsely interpreting a tip location, especially in children.

## P043

### **The 1st PICC team in Czech Republic – comparison of 2013 and 2017 results**

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**Introduction:** The nurses of PICC team insert PICC and midline catheters, take care of vascular access after a device introduction and educate their colleagues about standards of care. The 1<sup>st</sup> such a team in Czech Republic was instituted in September 2012

**Methods:** The evaluation of PICC team results in year 2013 and 2017. The number of PICC and midline catheters insertions and catheter dressing was compared as well as the spectrum of indications and methods for PICC insertion.

**Results:** 167 PICC and 165 midline catheters were inserted in 2013. PICC were indicated for chemotherapy in oncological patients while midline catheters when the approach to superficial vein was not available. PICC was inserted under physician supervision using fluoroscopy or landmark method with the next chest X-ray confirming the good position of PICC distal tip.

485 PICC and 1054 midline were inserted in 2017. 202 PICC were applied to the patients in ICU or admitted to hospital with nononcological disease. Midline catheter was preferred to peripheral cannula if the expected duration of intravenous access was more than 5 days. ECG navigation or sonography was used for the right position of the PICC distal tip.

No serious complication during catheter insertion was recorded. In 3% of patients the catheter could not be inserted because no acceptable vein was detected by sonography both in 2013 and 2017. 960 PICC dressings were made in 2013 and more than 2 500 in 2017 by PICC team. Midline catheters were dressed by ward nurses educated by members of PICC team.

**Conclusion:** The number of PICC and midline catheters inserted by PICC team significantly increased. The patients selection and methods of PICC insertion have improved.

## P044

### **Randomized controlled trial for safety and effectiveness of an integrated magnetic tracking and ECG-guided tip location system (SHERLOCK 3CG®) vs. fluoroscopy in implantation of peripherally inserted central catheter (power-PICC-line)**

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**Introduction:** Peripherally inserted central catheters (PICC-lines) have successfully been in use for many years now and are often implanted by nurses with the landmark technique or ECG-guided tip location systems instead of fluoroscopic technique. The aim of this clinical study is to assess the safety and efficacy of the SHERLOCK 3CG system, a fully integrated magnetic tracking and ECG-based medical device in comparison to fluoroscopy (x-ray) during implantation of the catheter.

**Method:** In a monocentric, randomized-controlled non-inferiority study with a sample size of 210 patients, the catheter tip location system SHERLOCK 3CG, was used in comparison to the method of fluoroscopy. The correct tip location in both study arms was verified with a final chest X-ray, as “gold standard” and after 24 hours a follow-up examination was performed to record any complications.

**Results:** As primary endpoint with 102 patients in the SHERLOCK study arm and 104 patients in the fluoroscopy study arm, the correct tip placement could be verified in 82.4 % in the SHERLOCK group and in 99 % in the fluoroscopy group. The non-inferiority of the SHERLOCK-system regarding the tip placement could not be verified and was not significant with  $p = 0.999$  (non-inferiority margin: 5%). Furthermore, as a secondary endpoint, implantation time for SHERLOCK was 8.35 minutes on average (standard deviation: 3.70 minutes) and for fluoroscopy 4.97 minutes (standard deviation: 2.66 minutes). Additional data analysis is ongoing and will be presented at WoCoVA 2018 for the first time.

**Discussion and conclusion:** As a primary endpoint, non-inferiority for correct tip placement cannot be proven for the SHERLOCK 3CG device. Furthermore, implantation time was deemed more time-consuming for the SHERLOCK group than for the fluoroscopy group and the need for technical improvements may be taken into consideration for the SHERLOCK 3CG tip location system.

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## P045

### Replacement short peripheral intravenous catheters with clinical monitoring

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**Introduction:** Intravenous (IV) therapy is nowadays one of the most common procedures to administrate different to

patients, especially in hospital environment. There are many problems derived from from insertion and maintenance of short peripheral intravenous catheters (PIVC), being after-puncture acute phlebitis the major of intravenous therapy.

**Objective:** to evaluate short PIVC left in place for as long as they are clinically indicated.

**Methods:** observational and prospective study of consecutive patients from internal medicine and surgery in an acute care hospital.

From sep16 till nov17 all consecutive patients with PIVC that were expected to stay in place and receive IV treatment for at least 48 hours.

Catheter insertion and care were standardized. To left catheter in place we used the phlebitis score.

**Results:** a total of 833 patients were enrolled in the study, 358 with polyurethanes catheters and due to a shortage in supply, 475 with FEP polymer. The gauge used was: 20% 18G, 20% 24G, 25% 22G 35% 20G. The mean patient age was 71+/-5 (range 45-96).

Catheter with FEP remained in site no more than 48 hours, 64% less than 24 hours they were replacement for extravasations or phlebitis.

Polyurethanes catheter left in place more than 96 hours, they were replacement for extravasations. The longest IV dwell time for a case patient was 12 days and 11 for five patients; all these catheters were removed for the end of therapy.

No cause of bacteremia occurred.

**Conclusions:** the results of our study are consistent with recent publications which support the idea not to change PIVC routinely and the polyurethanes catheter have better performance; it also allowed to avoid harm and discomfort to the patient and of course additional cost.

The hazard for catheter-related complications (mechanical, phlebitis, catheter-related infections) did not increase during prolonged catheterization.

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## P046

### Long-term outcomes of tunneled CVCs for treatment of pulmonary hypertension with strict application of CDC guidelines

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**Introduction:** Most patients with severe pulmonary hypertension (PAH) are dependant on continuous infusion

of pulmonary vasodilator – epoprostenol. Most published data focus on cardiologic outcomes such as mortality, quality of life or improvement of dyspnea. This retrospective audit aimed to analyze the insertion parameters and complications related to long-term catheters used in treatment of PAH.

**Method:** The charts of all patients treated with epoprostenol for PAH through the tunneled CVC in 2010-2018 period were reviewed retrospectively. Following data was retrieved: compliance with 2011 CDC guidelines, insertion site, use of ultrasound guidance, insertion complications, infection complications, thrombosis and total catheter days.

**Results:** In total, 25 patients were identified during the study period. 34 tunneled CVCs were inserted, mostly to the subclavian or brachiocephalic veins. The catheters remained in place for 20,082 days. Full concordance with the guidelines was observed in 32 insertions (94.1%). There were no acute complications, only two insertions (5.9%) were reported as difficult. Three episodes of CRBSI were documented – 0.15/1000 catheter days. They were caused by *Staphylococcus aureus* or MRSA. Tunnel/insertion site infection occurred in six catheters – 0.3/1000 catheter days. Reasons for catheter removal was tunnel infection (6 cases), CRBSI (1 case), catheter obstruction (2 cases) and mechanical rupture (2 cases). Ten patients (40%) died during the study period.

**Discussion and Conclusion:** Literature data regarding mainly CRBSI and site infection show higher incidence in patients treated with epoprostenol for PAH. However, employing strict compliance with 2011 CDC guidelines, complication and infection rates may be significantly reduced.

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## P047

### Spanish translation of the CASI (CVAD-associated skin impairment) algorithm

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**Introduction:** The use of central access devices (CVADs) has increased in our Onco-Hematology department. Dressings reduce the incidence of infection but contribute to skin impairment (1). Lack of consensus in its management triggered the need to unify criteria, searching for an evidence based tool we could use as guidance. We found the CASI algorithm developed by Broadhurst et al. (2) practical and useful for our needs.

**Method:** Permission for translation was granted by the original researchers. Back translation was conducted with evaluation of each step by a group of expert nurses in vascular access care (3,4). A pretest-posttest evaluation was conducted to compare the external validity of the original algorithm with the Spanish translation through the resolution of clinical scenarios. As in the original study five questions evaluating usability, clarity and general impressions of the algorithm were administered. Descriptive statistics was used to describe the validation results and a 2-tailed, paired-samples *t* test was used to compare mean clinician confidence pre- and postalgorithm.

**Results:** The algorithm translation was developed and revised by the expert group. Eighteen nurses from the Onco-Hematology department participated in the external validation. Unlike the original validation, the use of the algorithm did not increment clinician confidence in the resolution of the scenarios, except in skin injuries. The overall feedback for the algorithm was acceptable.

**Discussion & Conclusion:** Although the translation was validated by expert nurses it did not increment clinician confidence. We associate this result to the fact that some of the activities proposed by the original researchers differ significantly from routine skin impairment care activities conducted in our center. Modifications will be carried out to adjust the algorithm to evidence based activities in our center. We believe the translated algorithm can be useful in other Spanish-speaking clinical contexts.

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## P048

### Chinese experts consensus on ultrasound-guided PICC placement

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Ultrasound-guided central venous catheterization technique with high success rate of puncture and low complications

has become a highly recommended catheterization technique [Evidence level I] in the practice of intravenous infusion therapy. As an invasive technique, it can be independently operated by nurses. The success rate and safety of catheterization are closely related to the relevant knowledge and operation skills of the operator. In order to standardize the flow of PICC catheterization under the guidance of ultrasound, it is convenient to carry out relevant professional training in the future. In conjunction with well-known Chinese vein therapists, the basic ultrasonic knowledge, complications and standard procedures of PICC catheterization under ultrasound guidance were described comprehensively, and recommendations were made according to the grading strength based on the evidence basis. Forming China's "Ultrasonic-guided PICC tube placement technology experts consensus." The main contents of this consensus include: recommending the basic knowledge of ultrasound, the aseptic technical requirements of ultrasound-guided puncture catheterization, recommending the operator to use ultrasound to evaluate and select the best location and the best blood vessel, Master the skills and key techniques of ultrasound-guided puncture, identify and prevent complications associated with ultrasound-guided puncture. This consensus uses a recommendation rating assessment to develop and evaluate the system for assessing the quality of evidence-based medical evidence and the level of recommendations. In forming recommendations, not only the quality of evidence is taken into account, It also weighed the advantages and disadvantages of intervention, the variability of patient preference and values, the rational use of resources, the fairness and accessibility of recommended measures, etc.

Keywords: PICC, Ultrasound-guided, Chinese Consensus

## P051

### Complications associated with the use of a peripheral catheter in hospitalized children

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**Introduction:** Peripheral catheter maintenance in pediatrics is still a great challenge for the professionals involved, due to the factors that can interfere directly in this process.

**Objectives:** The present study aims to investigate the association between catheter permanence time and the characteristics of the drugs administered; characteristics of vessels, age of the children undergoing intravenous therapy, with the NEXICIVA® device, hospitalized at a Pediatric Reference Hospital in Fortaleza.

**Methods:** An epidemiological, observational and analytical study was carried out in a hospital of the state public

network, of pediatric referral of a capital of northeastern Brazil. The study included 480 children, who underwent intravenous therapy at the time of admission and who agreed to use the peripheral NEXICIVA® catheter.

**Results:** The children who participated in the study were randomly assigned, following the inclusion and exclusion criteria. All were punctuated by nurses and trained nursing technicians to use the device, obeying the manufacturer's technical norms. The data were analyzed by the SPSS 2.0 program. Scattering measures were calculated, central tendency; the value of  $p < 0.01$ , and the ODDS Ration. The vein being visible and preserved is a protective factor for complications related to therapy with odds of 0.8. Being an irritant / vesicant drug is 3 times more likely to cause complication when compared to normal PH drugs; the highest rate of complications, is associated with drug use than with inappropriate practices. It is concluded that it is important to be aware of the use of light technologies, such as algorithms to promote the correct choice of device.

Descriptors: Peripheral Catheterization, Complications, Quality, Intravenous Therapy

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## P052

### Clinical aspects related to the use of peripheral catheter in hospitalized children

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**Introduction:** important advances have been made in the area of intravenous therapy, which ceases to be a simple procedure and becomes a process.

**Objective:** the present study aims to analyze practical aspects related to the use of Nexiciva ® type peripheral catheters in hospitalized children in a reference pediatric hospital in a capital city in northeastern Brazil.

**Method:** a descriptive study was carried out in which 480 children were randomly assigned. The data were analyzed by the SPSS 2.0 program. Scattering measures were

calculated, central tendency; the value of  $p < 0.01$  was established.

**Results:** The mean age of the children was 6 years, the length of hospital stay was 13.7 days. Regarding the length of stay, 86.7% of the catheters remained from 1 to 7 days with a mean stay of 3 days, 48.9%, were hospitalized at the oncology unit, and used vesicant drugs. 64.0% had chronic disease, the main complication was infiltration (43.8%) and 95.6% of the catheters were punctured until the second attempt.

**Conclusion:** It was concluded that age, type of drugs, hospitalization time, and success in puncture directly interfere in the catheter's remaining time and in the occurrence of complications, independently of the characteristics of the device, in addition to all the technologies added to the device process.

Descriptors: Peripheral Catheterization, Complications, Quality, Intravenous Therapy

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## P053

### Carotid artery infusion via implantable jet-port-allround catheters for squamous cell carcinoma of the tonsils

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**Introduction:** Chemoradiotherapy has a dominant role in therapy of head and neck cancers. In order to avoid exceeding toxicity from systemic chemotherapy, drugs can be administered via the arterial route through special Jet-Port-Allround catheters.

**Method:** Through a transverse incision above the clavicle the common carotid artery is exposed. The tip of the Jet-Port-Allround catheter is inserted through a stab incision and fixed with a purse string suture. The port is connected to the catheter and placed into an infraclavicular pouch. The correct position of the catheter is controlled by injection of blue dye. If the tumor extends to both sides, Jet-Port-Allround catheters are implanted bilaterally. For prophylaxis thrombosis, patients received Aspirin 100 mg/day for three months. Repeated flushing is not necessary.

**Results:** Eleven patients were included in this trial. 7/11 chemoradiation naïve patients showed clinically CR, and have been disease-free for 16 to 117 months. 4/11 patients who had relapsed after prior chemoradiation, showed only poor response and median survival was 7.5 months.

**Discussion:** Intra-arterial chemotherapy administered via angiographic catheters is considered technically complex. With implantable Jet-Port-Allround catheters drugs can be administered easily without technically demanding and time or staff intensive procedures. Increased drug exposure can be combined with simultaneous chemofiltration in the venous return from the tumor area for prophylaxis of increased toxicity.

**Conclusion:** Intra-arterial infusion generates high regional concentrations of chemotherapeutics despite low total dosage. In combination with chemofiltration, systemic toxicity can be kept low. Regional chemotherapy through implantable Jet-Port carotid artery catheters is safe, facilitates intra-arterial chemotherapy and shows significant improvement to standard therapies in terms of locoregional and distant tumor control and quality of life.

## P054

### How the implementation of leaderflex midlines by the opat cns has improved patient care in a small east London trust

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Leaderflex midlines were introduced to Homerton University Hospital in June 2015 to bridge the gap between Peripheral Venous Catheters (PVC) and Peripherally Inserted Central Catheters (PICCs).

Before the use of Leaderflex, patients with PVCs were not accepted by District Nurses (DNs). They either had to remain an inpatient until the end of their treatment, attend the Medical Day Unit (MDU) daily which excluded patients with limited mobility; or have a PICC line inserted. Patients within the hospital were also referred for PICCs after multiple PVC failures; delaying effective treatment and not ideal for vessel health preservation.

Leaderflex is licensed to remain insitu for 30days. Patients suitable for OPAT but not able to attend MDU had Leaderflex inserted and were now accepted by DN's, enabling more patients to be accepted for OPAT. This also benefited inpatients with poor peripheral veins who no longer needed to be recannulated every 72hrs (EPIC2 2007) or where a PICC would have been too invasive for short IV treatments (Vessel Health & Preservation Framework 2016).

Leaderflex has improved patient experience by reducing painful repeated cannulations, clinician's time spent with difficult IV access patients and reducing missed and

delayed doses of treatment; resulting in earlier discharges due to effective treatment and promoting vessel health.

Patients who require IV treatment for less than 30 days receive less invasive lines, reducing risk of infection and earlier placement. They are inserted on the day of referral, at the bedside, do not require a chest x-ray and the procedure lasts approximately 30 minutes. PICCs are inserted within 24-48 hours in the X-ray department, require a chest x-ray to confirm tip position and are approximately a 2-hour procedure.

From June 2015 to January 2018, the OPAT CNS has inserted 117 Leaderflex midlines (£44.60) instead of PICCs (£100.37), saving the Trust £6,525.09, excluding x-ray costs.

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## P055

### Portocator, an evaluation of a novel device to assist in accessing implanted iv ports

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Implanted IV Ports (IPs) are increasingly more common in the healthcare setting. Patients with IPs experience a great degree of variance in the experience of having their IPs accessed. Successful IP access will depend on the experience and skill of the Healthcare professional.

The Portocator is a small plastic device that sits on the skin over the IP insertion site. Its purpose is to enable the successful insertion of a non-coring needle into the centre of the IP.

**Method:** An evaluation of the Portocator was undertaken in 2 busy hospital units in the United Kingdom. A medical day unit, and an IV therapy unit.

The evaluation took place over a period of 13 weeks and enrolled 11 patients with IPs across both units.

The evaluation looked at the success rate with the Portocator on the first and attempt. Of the 11 IPs accessed 8 out of the 11 patients had experienced at least one or more previous failures in access their IPs.

All the patients in the evaluation were outpatients and all were having their IPs regularly on a weekly, 2 weekly or monthly basis.

**Results:** The Portocator improved the success rate of first time IP puncture with a non-coring need. Patient satisfaction increased alongside confidence that the IP was accessed correctly.

In the medical day unit where the level of nursing skill in accessing IPs is limited the nursing staff felt better supported while using the Portocator and were more likely to undertake the procedure with confidence.

**Discussion/conclusion:** The Portocator is inexpensive, easy to use intervention to assist with accessing IPs. It is easy to implement and is now part of our units IP practice. It is now available in a bespoke IP care and maintenance pack. Staff and patients are very happy with the device.

## P056

### Benefits of the implementation of the peripherally inserted central venous catheter in the nursing practices of a medical service in Portugal

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**Introduction:** The incorporation of a new technology for healthcare in nursing practices, such as the peripherally inserted central venous catheter (PICC), requires the acquisition of new knowledge in order to be translated to benefits. These benefits may be for the sake of the patient and the nursing team itself<sup>(1-2)</sup>. In view of implementing PICC in the nursing practices of a medical service in Portugal, research was conducted with the **objective** of understanding the benefits of implementing PICC in the nursing practice.

**Method:** A qualitative approach using the focal group technique. Five nurses who cared for PICC patients in a medical service in Portugal participated. The interviews of the focus groups were recorded, and transcription and thematic analysis followed.

**Results:** Benefits for the patients: reduction in the number of venous punctures to collect blood for analysis and for the insertion of the peripheral venous catheter (PVC), avoiding pain by replacing the routinely used venous puncture by PICC, less anxiety related to venous puncture and reduction of local complications such as phlebitis and infiltration. Benefits for the nursing team: a decrease in the number of venous puncture attempts to insert the PVC, eliminating patients without venous access on which to administer intravenous treatments thereby reducing stress, reducing time of nursing care in looking for a peripheral venous access and medication administration was performed safely and quickly.

**Discussion & Conclusion:** The selection of the venous catheter in line with scientific evidence and patient characteristics<sup>(3)</sup> and the acquisition of specific skills through continuing education are factors that favor the implementation of the PICC in nursing practices<sup>(4)</sup>, translating into qualitative benefits for the patients and the nursing team alike.

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## P057

### JLB®: a solution for ultrasound-guided cannulation of veins of medium and large caliber in the Emergency Department

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**Introduction:** Intravenous cannulation is one of the most frequent and fundamental procedure performed in the Emergency Department (ED), so research is involved in finding innovations able to ensure a rapid and safe venous access when circumstances (patient's condition and comorbidities, setting, materials, operator's expertise) are adverse. JLB® is a single lumen polyurethane over the needle long cannula especially designed for ultrasound-guided cannulation of the Internal Jugular Vein (IJV) in the ED. It is available in different lengths (6, 7 and 8 cm) and different calibers (14, 16, 17 and 18 Gauge) ensuring flow rates from 74 to 283 ml/min.

**Methods:** The overall performance of JLB® has been studied from June 2015 in a multi-center observational prospective study, which evaluated the feasibility and safety of using JLB® to achieve a peripheral venous access in acutely ill patients with difficult intravenous access (DIVA). Cannulation was performed by attending physicians or Emergency Medicine residents.

**Results:** We enrolled 700 DIVA patients. Mean age 72,2 years. JLB® was placed mostly in IJV(665); other site of cannulation were Basilic (22), Femoral (12) and External Jugular vein (1). Mean procedural time (skin preparation to catheter securement) was 2 minutes and 20 seconds. Mean number of attempts of cannulation was 1,17. Early complications occurred in 2 patients (1 local hematoma, 1 atrial tachyarrhythmia). No PNx and no major complications were reported. Median dwelling time was 7 days. When done, tip culture after removal showed no pathogens growth.

**Conclusion:** Preliminary data show that JLB® insertion results easy, safe and rapid. If compared to other long cannulas it is longer and needs an over the needle technique, with a consequent reduced risk of dislocations and procedural complications and the possibility of cannulating deep veins.

## P058

### The mechanistic causes of peripheral intravenous catheter failure based on a parametric computational study

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Peripheral intravenous catheters (PIVCs) are the most commonly used invasive medical device, yet up to 50% fail. Many pathways to failure are mechanistic and related to fluid mechanics, thus can be investigated using computational fluid dynamics (CFD). Here we used CFD to investigate typical PIVC parameters (infusion rate, catheter size, insertion angle and tip position) and report the hemodynamic environment (wall shear stress (WSS), blood damage, particle residence time and venous stasis volumes) within the vein and catheter, and show the effect of each parameter on each measure. In some PIVC configurations WSS was 3254 times higher than the patent vein, and blood damage was 512 times greater when compared to control conditions. Residence time is geometry-dependent and decreases exponentially with increasing insertion angle. Stasis volume decreased with increasing infusion rate and, to a lesser degree, insertion angle. Even without infusion, the presence of the catheter changes the flow field, causing low velocity recirculation at the catheter tip. This research demonstrates how several controllable factors impact important mechanisms of PIVC failure. Catheter infusion rate has the greatest impact on our measures, with catheter orientation also playing a significant role. These data, the first of their kind, suggest limiting excessive infusion rates in PIVC.

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## P059

### Derivation of a tool for Justification of Emergency Department clinically indicated peripheral Intravenous (JEDI) catheters. Toward vessel health preservation with the JEDI PIVC tool

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**Background:** It is well established that the idle peripheral intravenous catheters (PIVC) provide no therapeutic, clinical, or economic value. A tool for clinically indicated peripheral intravenous catheter (CIPIVC) insertion might assist clinicians to choose and practice wisely.

**Methods:** We used PIVC insertion data from a multicentre cohort study we defined CIPIVC as one used for a specific clinical procedure such as: prescribed intravenous (IV) fluids; and/or prescribed IV Medication; a CT Scan; and if the patient was >80% likely to need a PIVC for any clinical concern. Using logistic regression techniques we derive a tool for CIPIVC insertion.

**Results:** In 817 patients, CIPIVCs were observed in 68% of patients. Seven unique professional roles insert PIVCs in EDs. Admitted patients were significantly more likely to have a CIPIVC, OR=3.05, 95% CI=2.17-4.30,  $p<0.0001$ . Patients that definitely needed IV fluids/medicines OR=3.30, 95% CI=2.02-5.39,  $p<0.0001$  and who definitely needed a contrast scan OR=3.04, 95% CI=1.15-8.03,  $p=0.0250$  were significantly more likely to have a device inserted for a clinical indication. Patients who presented with an existing vascular access device were more likely to favour a new PIVC for use OR=4.35, 95% CI=1.58-11.95,  $p=0.0043$ . When the clinician's gestalt which represented as pre-procedural likelihood of

therapeutic use >80% it was independently associated with CIPIVC; OR 3.16, 95% CI=2.06-4.87,  $p<0.0001$ . The area under the receiver operating characteristic curve was 0.81 and at the best cut-off the model yields a specificity of 0.81, sensitivity of 0.71 a positive predictive value of 0.89 and negative predictive value of 0.57.

**Conclusions:** CIPIVCs should be performed for Procedures requiring a PIVC e.g. computerised tomography scans or serial blood sampling; and or; indication for IV; fluids and or medicines that cannot be tolerated eternally and are suitable to for dilution in peripheral veins; Clinician likelihood of use is greater than 80%.

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## P060

### Subclavian vein access to long term catheter placed in the arm to avoid complication and infection: A new surgical strategy in pediatric oncology

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**Introduction:** In our Institution, since 1994, about 140 long term venous catheters/ year were inserted using brachial and/or axillar veins dissection. In 2014, puncture of subclavian vein has been used as the first option in some cases, utilizing the reservoir/tunneled catheter positioned in the arm. Describe a new technique of venous catheter implantation and the main complications related to the catheter.

**Method:** This is a retrospective study with children cancer with median 5 y/old.

**Results:** Complications as infections were compared in all techniques. 447 long term catheters were inserted, 267 totally implanted and 174 Hickman's (6 was not included); 294 dissection of arm veins, 115 Subclavian punctions, 6 Jugular punctions (26 cases were excluded). Infection

rates were 15% in port catheters: 12,7% dissection technique and 2,2% (6/267 subclavian puncture) and 24% (42/174) in Hickman's: 19% dissection technique, 4% subclavian puncture and 1,1% Jugular puncture. Trombosis rates occur in one port catheter (100% dissection technique) and 2 in tunneled catheters (100% dissection technique). A minor cause of complications related were obstruction, rupture and exteriorization.

**Discussion and Conclusion:** The use of the arm to place the reservoir/tunneled catheter was widely used since 1994, providing a safe and a better quality of life during treatment. Subclavian vein as mainly venous access to Port/Hickman's catheter insertion has shown an appropriate choice without major complications.

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## P061

### Our experience with central venous catheter (CVC) maintenance using Grip-Lok

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Clinical nursing guidelines for CVC maintenance stresses regular care of the insertion site and safety checks.

The study aimed to assess the advantage of using Grip-Lok to secure catheter position.

**Methods:** A total of 40 patients with CVC vascular access for haemodialysis were followed between 01/10 to 30/11/2017 at the Department of Nephrology, Dialysis, and Kidney Transplantation, Rijeka CHC. Patients were divided into two groups of 20. For the first group, Grip-Lok was used as an additional measure of securing the CVC position, while the other group served as a control group where ordinary measures were used. Protocol saw changing of dressings and Grip-Lok once a week.

**Results:** In the first group, 11 patients with temporary and 9 patients with permanent catheters were followed. Five complications were observed during the time period, and one patient required additional sutures. In the control group, 12 temporary and 8 permanent catheters were

followed. Additional sutures were required in four patients, and eight complications were observed. Infection of the insertion site was observed in only one patient.

**Discussion:** Satisfaction was rated at 9.6/10 by patients, 9.4/10 by nurses, and 9.8/10 by nephrologists. Allergic reactions were not observed.

**Conclusion:** The use of Grip-Lok reduced the number of complications to 25%, compared to the control group at 40%. For such a large area of use, it is necessary to follow patients for a longer period of time, still this research confirms the advantage of using Grip-Lok.

## P062

### Extended subcutaneous route in PICC insertion: A subcutaneous tunnel without surgical maneuvers

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**Introduction:** Peripherally inserted central catheters (PICCs) are taking an increasingly role in both hospital and home care and represent an attractive alternative to central venous catheters (CICCSs). One of the major current limitations to the use of PICC is represented by the need of an adequate calibre of the vein. In case of too small veins at the middle third of the arm, it is possible to shift near axillary vein and maintain the correct position for the exit site of the catheter through a subcutaneous tunnel of few cm lengths. In clinical practice, Picc Team ASST-Monza has been implemented the "Extended Subcutaneous Route" technique (ESR). It is a simply technique for create an ultrasound-guided tunnel during venipuncture, without any skin incision or other surgical maneuvers.

**Objective:** evaluate the feasibility and safety of the ESR technique in clinical practice and the differences with the conventional tunneling technique.

**Methods:** we observed PICCs tunneled using the ESR technique, commonly performed by PICC team staff, and PICCs tunneled using standard technique. Procedural and mid-term complications were recorded and analyzed with SPSS for Windows ver 19.

**Results:** 158 PICCs inserted with ESR technique and 125 PICCs inserted with standard tunneling technique, from July 2015 to June 2017, were analyzed. CRBSIs and DTVC related rate were not statistically different between the two groups. No major complications during insertion occurred.

**Discussion and Conclusion:** The ESR technique is a low-risk and feasible procedure during PICC insertion. Tunnel performed by ESR is similar to what can be achieved by classic subcutaneous tunnelling technique, but with less time, lower risk of bleeding, less tissue manipulation and the absence of skin incisions. ESR technique can allow an easy and safe tunneling maneuver in any kind of patient.

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## P063

### PICC Group: The trajectory of the implantation of a dedicated team at Hospital de Grande Porte in Brazil

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In Brazil, it's considered legal for the nurse to insert the PICC, and must undergo the qualification and or specific qualification for the insertion of the catheter, according to COFEN Resolution 258/2001.

**Method:** This is an experience report about the trajectory of the group of PICC of private and large hospital in the city of São Paulo.

**Results:** The PICC group was formed with the purpose of attending the requests passage within 24 hours, evaluating, following the first 24 hours of catheter insertion, performing an active search for complications and work the education of patients and professionals regarding maintenance. The idealization of the group began in 2013, when the number of catheters was measured in the institution, and it was possible to observe an increase in the number of requests that were not attended in full due to a lack of nurses directed to the activity. With a considerable increase in the number of tickets up to May 2014 (figure 1), it was proved the need of a team directed to meet the demand with greater quality and effectiveness. With the formation of the PICC group, a protocol for insertion, maintenance and withdrawal of the catheter was designed, standardizing the actions of the nursing team, training the team in the maintenance, dressing and removal, enabling nurses reference for passage, maintenance and withdrawal in the absence of the group.

**Conclusion:** It is considered essential that the nurse acts exclusively for the insertion of the PICC catheter to ensure continuity of care through a safe intravenous therapy, improving indication of catheter use, greater assertiveness in the puncture, and looking for maintenance, thereby reducing risk and increasing customer satisfaction and cost of the institution.

## P064

### Complex vascular access: Mid-thigh femoral PICC placement

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**Background:** The value and need for Vascular Access Specialists is more and more apparent every day. Expansion

in the scope of practice from the peripheral IV, midline, and PICC placement into CVC and HD catheters is natural progression of the specialty.

**Method/Case Study:** The Vascular Access Team was consulted to evaluate a 38 y/o a quick visual assessment of the patient revealed a left arm fistula and bruising of the right arm from multiple unsuccessful PIV attempts. Ultrasound exam revealed significant stenosis at the confluence of the right internal jugular, subclavian and brachiocephalic veins. A decision was made to place a Mid-thigh femoral PICC. A measurement was taken from the prospective insertion site to the inguinal fold and up to the xyphoid process. This length was 58cm. The PICC has a total length of 55cm.

Catheter to vein ratio (CVR) was calculated for the patient. CVR was calculated incorporating the use of the reverse taper of the catheter, as it was fully inserted into the vessel to maximize the length of the catheter to reach the IVC. The patient's vessel diameter measured 10.60mm and was well within the acceptable catheter to vein ratio range

**Conclusion:** During the 19 days of dwell the patient had over 21 blood draws from the catheter. The dressing stayed dry and intact until it was time to do a dressing change. The MTF PICC served this complex patient well, it reduced the number of needle sticks and failed PIVs he experienced at the end of his life and dwelled without complications.

**Discussion:** The value of the Vascular Access Team is instrumental to our provision of achieving greater patient outcomes. With the appropriate attitudes, actions, and continued support, patients are sure to get the right devices at the right time.

## P065

### Reducing venous depletion

C. Girgenti

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**Background:** As we look at vascular access and the advances that have been made over the past several years in helping nurses and doctors improve patient outcomes, there remains a challenge providing care for patients that need IV antibiotics for longer than 3 days. PIVs are the most common invasive hospital procedure in the world and, unfortunately, have a failure rate of 35% to 50%. PIV failures can lead to phlebitis, infiltration, occlusion and infections as well as potentially the insertion of an unnecessary vascular access devices.

**Methods:** Implementing the use of a 22g thermos-sensitive polyurethane catheter in lengths of 4cm, 6cm 8cm and 20cm with an indication of 29 days, using Seldinger technique leads to "first-time" success. As well as adding proper securement yields a longer dwell time. A longer dwell than what is seen with the traditional short catheters even when changing them when clinically indicated.

**Results:** Increased patient satisfaction, reducing needlesticks and completion of therapy with one peripheral device in the lower arm. Preserving the vessels of the upper arm and reducing venous depletion has been realized. 600 extended dwell, 22g catheters placed, with 83% of patients completing therapy or discharged with catheter in situ.

**Discussion:** Several articles and studies are beginning to look at what a vascular access device would look like that could fulfill this need. It is suggested that vascular access nurses consider a catheter gauge, length, material, insertion technique, insertion location and the type of stabilization/securement used to reduce repetitive PIV attempts to reduce infections.

**Conclusions:** In an effort to reduce the failed number of IV attempts, infections and reduce venous depletion. We can no longer accept the current failure rates of PIVs when an alternative exists. Alternative that will reduce cost, but more importantly improve patient satisfaction and reduce venous depletion.

## P066

### A call to action for vascular access data collection

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**Background:** Data has been a driving force for creating benchmarks in care. In today's healthcare climate, vascular access teams must show their value to everyone. Using a national and international level Registry (like physicians do for multiple disease states) to create benchmarks in vascular access is imperative. It will allow the ability to move the specialty to CVC placement, allocate for additional FTEs and impact safety. Data will solve the need to keep and have a VAS in every hospital.

**Method:** An internet-based, encrypted, password protected website designed to collect data on vascular access procedures is used daily. We collect data immediately after each procedure so no impact in our daily schedule. We assess patients, place lines and monitor outcomes using the Registry. Data is collected and displayed real-time for use. Each clinician sees their individual data, team and national comparisons.

**Results:** Using a Registry has allowed PSJMC to demonstrate high success rates and low malposition rates and integrated national level data into a formal business plan to demonstrate the need for additional FTEs. Utilizing the Registry as an assessment tool for previously placed PICCs to determine the right device for the patient.

**Discussion:** VAS are at the forefront of care, interacting with virtually every patient and every disease state. 90% of hospitalized patients receive some type of vascular access device. Having the ability to build and use national level

data demonstrates the value of the specialty and the commitment to creating benchmarks and improving patient care outcomes.

**Conclusion:** A call to action is vital for every Vascular Access nurse to participate in this worldwide data collection tool. The voice of vascular access becomes stronger and will have a greater impact for the patient that requires devices. Data will drive the effort for a Vascular Access Specialist in every hospital.

## P067

### In-line filtration increase patients' satisfaction on perioperative peripheral venous cannulation: A qualitative survey

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**Background:** Thrombophlebitis is a frequent complication of peripheral venous cannulation (PVC) among hospitalized patient undergoing surgical procedures. It often produces severe discomfort, pain and movement limitation. As previously demonstrated, in-line filtration had an independent effect in reducing postoperative thrombophlebitis in a cohort of surgical patient[1]. The aim of this qualitative survey is to evaluate the effect of in-line filtration in improving satisfaction on perioperative PVC.

**Methods:** Patients enrolled in the previous trial[1] were analyzed 6 months after their hospital discharge through a self-reported qualitative questionnaire. This assessed several domains related to PVC, such as the overall patients' satisfaction, comparison with previous experience, discomfort, functional limitation and chronic symptoms related to post-phlebitis syndrome.

**Results:** Among the original population enrolled in the randomized trial, 110 (82%) and 103 (76.9%) patients respectively for in-line filtration and control groups were available for this prospective survey (tab.1).

Within in-line filtration group, 97.3% of patients were satisfied/really-satisfied on the perioperative management of their PVC; if compared with previous experiences on PVC, 11% of them recognized in-line filtration as a relevant causative factor in determining their satisfaction. Among patients within control group, 93.2% were satisfied/really-satisfied on the perioperative management of their PVC, although up to 30% of them experienced postoperative phlebitis. At the qualitative interview they recognized no differences than previous experiences on PVC, and mentioned postoperative phlebitis as a usual complication that "normally occur" during hospital stay.

Un-satisfied patients were double in the control group (6.8%) than in the in-line filtration group (2.7%). Every un-satisfied patient within in-line filtration group had a

venous cannula of large diameter, placed in a site different than the recommended cephalic vein of the arm and presented postoperative phlebitis.

**Conclusions:** In-line filtration contributes, beside other good practices on insertion and management of PVC, in increasing patient satisfaction and reducing PVC-related discomfort.

## References

Giua, G. Villa et al. La filtrazione in-linea riduce l'incidenza di flebiti postoperatorie: risultati di un trial clinico randomizzato controllato. GAVeCeLT 2017

## P068

### Central venous access for acute extracorporeal dialysis: A promising experience by dual lumen power injectable CICC and off label used PICCs in newborns and infants

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**Introduction:** Acute extracorporeal dialysis is a short term treatment, performed by a central venous catheter of large size, ensuring high flow. These devices have limitations: high caliber, excessive length, impossibility of tunneling and exit-site location in the supraclavicular region, with a subsequent high risk of dislocation and contamination.

**Aims:** The authors report an unprecedented approach to the choice of dialytic central venous catheters in children.

**Materials and Methods:** From January 2013 to December 2017, 16 children weighing less than 15 kg necessitated acute extracorporeal dialysis. Patients received an ultrasound guided percutaneous implantation of a two-way PICC power injectable catheter, in the right internal jugular vein or in the anonymous right vein. The device size always respected the ratio of 1/3; the catheters were cut to be adapted to child height, and subclavicular tunnelizations and stabilizations were ensured. The hemodialysis was performed with the Prismaflex Gambro system. The effectiveness of treatment was evaluated by recirculation test and at the third hour by measuring the KT/V, which expresses the dialysis adequacy.

**Results:** two-way power injectable central venous catheter sized from 5 to 7 Fr and long from 8 to 15 cm were used. The recorded blood flow ranged from 4.7ml/min/kg to 7ml/min/kg; a KT/V variable from 0.5 to 1 was detected; the recycling rate was between 32% and 40%. No catheter related complications were observed.

**Conclusions:** In children weighing less than 15 kg, PICC power injectable have lower blood flow and higher recirculation rate compared to traditional dialysis catheters.

However, the dialytic adequacy was suitable for an acute hemodialysis treatment. In addition, these catheters are available in a wide range of calibers and result more adaptable to the venous system of younger children.

## P069

### The First FDA approved and novel cyanoacrylate product for catheter securement

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**Introduction:** Intravenous catheterization is the most common invasive hospital procedure used today with the global use of peripheral venous catheters estimated at greater than 1 billion units per year. There are many complications associated with catheterization such as dislodgement, phlebitis, and infection with overall peripheral IV catheter failure rates reported to be 43%. To combat this high failure rate an innovative catheter securement adhesive (CSA) was developed to provide a 3-in-1 solution offering securement, infection prevention, and hemostasis at the site of intravascular catheterization.

**Method:** The CSA was tested to demonstrate securement strength, flexibility, water resistance, infection reduction and hemostatic properties. The securement strength was measured by securing catheters on porcine skin and measuring the pounds-force required to detach the catheter by a tensiometer. The flexibility and water barrier properties were measured in vitro utilizing artificial and pig skin, respectively. The infection prevention properties of the adhesive formulation were measured in vitro utilizing bacteria sensitive agar plates. The hemostatic properties were measured in vitro and in vivo utilizing clotting analyzers and porcine subjects, respectively.

**Results:** The CSA proved to be up to nine times stronger than other catheter securement dressings and tapes for securing catheters. Compared to other known adhesives the CSA was found to have increased flexibility and to provide a water barrier. The CSA demonstrated an activated clotting time 12 times quicker than Thromboplastin in vitro and was significantly equivalent to two known hemostatic products in vivo. The CSA formulation was proven to immobilize greater than 8.0 logs of bacteria.

**Discussion & Conclusion:** This innovative CSA provides superior securement of the catheter, preventing against dislodgment and pistoning, acts as an infection prevention agent to protect against bacteria commonly associated with CRBSI and has hemostatic properties while the polymerized surface offers increased flexibility and a waterproof barrier.

**P070****Pre-clinical outcome of alexidine-treated intravenous catheter for antimicrobial and antithrombotic effectiveness**

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**Introduction:** Intravenous catheters (IVCs) have advanced in recent years by incorporating antimicrobials, heparin, silver etc. for minimizing catheter-related complications such as infection, occlusion and thrombosis. The purpose of this investigation was to assess antimicrobial and antithrombotic effectiveness of a new IVC treated with Alexidine, an antimicrobial agent, in a sheep model with *Staphylococcus aureus* (SA) infection.

**Methods:** Untreated (Control) and Alexidine-treated (ALX) IVCs were placed into 12 sheep for either 7- or 30-days (n=3 per group per timepoint) through left jugular vein in to superior-vena-cava. Prior to placement, insertion sites were inoculated with SA. Subsequently, explanted catheter, fibrin sheath and vein tissue were analyzed for microbial presence (via viable cell counts), fibrin sheath (FS) accumulation (via weight and length measurements) and venous thrombosis (by grading histopathological features). Additionally, clinical observations (such as body temperature, weight, blood cultures) were made throughout the study period.

**Results:** Viable cell counts from the explanted catheters, sheath and surrounding tissues ranged between  $10^5$ - $10^8$  CFU/cm from the 6 Control animals and 0 CFU/cm from the 6 ALX animals in both time cohorts. In the 30-day cohort, 2/3 Control animals also developed fever accompanied with SA positive blood cultures, while the 3 ALX animals remained healthy. In both time cohorts, all Control animals exhibited presence of extended FS, phlebitis, thickened vein wall, and complete venous occlusion in 3/6 animals; all ALX animals showed normal vein wall and FS presence limited at the insertion site. As compared to Control group, reduction in FS weight for the ALX group was 95% at 7-day and 99% at 30-day timepoints, while reduction in FS length was 82% at 7-day and 92% at 30-day timepoints.

**Conclusions:** Alexidine-treated IVC was highly efficacious in reducing microbial colonization, fibrin sheath formation, CRBSI and venous thrombosis for 30-days in the sheep model with SA infection.

**P072****Novel CVAD lock solution for high-risk patient population on home parenteral nutrition**

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**Introduction:** There is an interrelationship between bacteria, biofilm, and fibrin that is responsible for the high incidence of treatment failure and catheter loss. It is through the understanding of these complex interactions in CVADs that we can begin to develop strategies to improve outcomes. With Home TPN, patients have chronic illnesses and CVADs that are essentially their "life lines" and these strategies are key to their ongoing success on a Home TPN Program.

**Method:** This session will describe the experience of a Home TPN Program that implemented a novel lock solution for patients that are at risk for occlusion and infection based on clinical status and infusion therapy (TPN). Consideration for this change was based on evidence to support the elimination of heparin for a lock solution and a recent publication of evidence-based criteria for appropriate CVAD lock solutions. Data was tracked prospectively on incidents of occlusion and infection, with the need for intervention and removal/replacement of the CVAD.

**Results:** With 25 patients on the regime at time of abstract submission, we have seen a decrease of over 50% of infection incidents and a decrease in our CLABSI rate. What is most promising is the significant decrease in occlusion management requirements with a marked decrease in fibrinolytic agent use. This has led to decreased hospitalization of these patients and increased patient satisfaction and quality of life as they are able to remain at home and independent on home TPN therapy with patent and "clean" lines.

**Discussion/Conclusion:** Our main objectives for this patient population is to remain at home, on their prescribed therapy and with patent and "clean" lines that ultimately keeps them out of the hospital. The implementation of this CVAD lock solution has enable us to meet our objective as well as increase patient satisfaction and quality of life.

**P073****A case review of a patient experience of extracorporeal photopheresis using a peripherally inserted central catheter (PICC)**

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**Introduction:** Extracorporeal Photopheresis (ECP) is a cell based, immunomodulatory therapy. During ECP a patient's blood is collected via either a central venous access device (CVAD) or a peripherally inserted 16G arterial venous fistula needle. However, patients presenting for ECP with Graft Versus Host Disease (GVHD) repeatedly present a challenge to the ECP team due to poor venous access due to skin changes. The use of peripherally inserted central catheters (PICCs) offers an alternative route of vascular access for this cohort of patients. Here we present the case report of a patient treated within the Photopheresis setting following the insertion of a PICC.

**Method:** ECP within the unit is delivered using the Therakos Cellex machine version 5.1 (Mallinckrodt Pharmaceuticals (Therakos (UK) Ltd.). The treatment aims to process 1500mls whole blood. This single patient case review describes the use of a PICC for vascular access during a course of ECP treatment. This treatment was facilitated with the insertion of a Xcela (Navilyst Medical Inc, Marlborough, US) power injectable single lumen 4 French PICC which was inserted with ultrasound guidance into the basilic vein of patient's upper left arm.

**Results:** The patient has been attending for two treatments on alternative weeks and has had 10 full treatments so far using the PICC with no adverse events.

**Discussion/Conclusion:** Based on this case review the use of a PICC for ECP represents a useful and safe alternative to CVAD for patients with difficult venous access. The Photopheresis unit intends to roll out the use of a PICC as an alternative to more patients with difficult access. Success was aided with optimal tip location, reliable securement and the adoption of a number of processes to prevent infection. Although successful, we intend to increase the gauge size of the PICC to 5Fr for the next patient.

#### P074

##### Time as a variable in the correction of aberrant PICC tip location

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**Introduction:** The purpose of this poster is to present a number of case histories that are associated with aberrant peripherally inserted central catheter (PICC) tip location and spontaneous correction within forty-eight hours. Aberrant PICC tip location may occur despite the various technologies available that aid successful PICC tip. In general, these technologies aid identification of the PICC tip. However, they do not assist with the anatomical journey that is required for successful tip placement. The case studies presented demonstrate unassisted correction of PICC tip despite the original extreme aberrant tip location.

**Method:** We identified six patients that had an aberrant tip location immediately post PICC insertion. These series of case studies show the extent of the aberrant nature of the PICC tip. In addition, they demonstrate unassisted correction.

**Results:** All six PICCs were placed in the right side of each patient. Two were 5Fr double lumen and four were 4Fr single lumen PICCs. The extreme tip location of each PICC resolved unaided within forty-eight hours.

**Discussion/Conclusion:** The authors advocate the use of technology to determine tip location. However, if appropriate and tip location is unattainable the authors experience as described in this series of case studies suggests that time may be a factor that aids unassisted correction of PICC tip. From the range of aberrant PICC tip locations

described in this article we suggest that PICC placers consider that aberrant PICC tip locations are hugely variable.

#### P075

##### Performance testing of peripheral IV securement in a clinically simulated environment

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**Introduction:** Mechanical IV complications arise when one or more of these components are manipulated by external forces. The purpose of this study was to closely analyze how tension on an IV line impacts catheter function by understanding the nature of infusion component failure during simulated dislodgement scenarios.

**Method:** Four leading PIV securements/adhesives were evaluated. To mimic a human forearm, hairless porcine belly skin was used. The skin samples were then secured over a 3" diameter PVC pipe to simulate forearm curvature. A 20ga catheter was inserted and connected to a standard bore IV extension tubing. The end of the extension tubing was then tied into a firm knot around the hook of the Instron®, and slow motion videos were taken to observe failure modes, loss of potential catheter function, dressing disruption and full dislodgement.

**Results:** There was a significant difference in the mean force observed at loss of catheter function specific to each pull angle. The failure modes observed were consistent with respect to each securement device. Similar performance data was observed in the 90° axial and 90° shear pulls, while the performance data from the 0° axial pulls was either much higher or much lower than its 90° axial and shear counterparts.

**Discussion:** Dressing integrity and catheter function was not significantly threatened by forces up to 4.3 lbs. While many of the securement devices maintained catheter function beyond 4 lbs of force, it's unclear what impact that forces between 4 lbs and complete loss of function have on a dwelling catheter. Catheter hub migration and catheter dislodgement were the failure modes observed in >90% of tests.

**Conclusion:** The point at which a catheter loses function under tension is driven primarily by securement/dressing design and angle of tension. More research is required to identify optimal primary and secondary securement methods to extend PIV catheter dwell times.

#### P076

##### CT evaluation of accurate catheter tip positioning techniques in upper arm central venous port implantation: Intracavitary ECG versus fluoroscopy

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**Introduction:** Implantation of upper arm central venous port catheters require more accurate tip positioning techniques. Although chest X-ray radiographs are currently the “gold standard” for determining catheter tip location, intracavitary electrocardiogram (IC-ECG) -guided techniques are found to be more advantageous. In this retrospective study, we analyzed the location of the catheter tip by postoperative CT scan and compared the two positioning techniques.

**Method:** 85 patients received upper arm port implantation from August 2014 to December 2017, and 55 patients who underwent CT scan were recruited. In IC-ECG group, the ideal end position for the catheter was where the ECG showed P wave at its maximum height, and the ECG was the only guidance method during operation. The proper location of the catheter tip by CT scan was defined as in the lower third of the superior vena cava or within 2 cm below cavo-atrial junction.

**Results:** There were 28 patients in X-ray group, and 27 patients in IC-ECG group. In IC-ECG group, 81.48 % of the catheter tip was located at proper position by CT scan, as compared to 57.14 % of the tip position in X-ray group was proper ( $P=0.027$ ). 20 patients in IC-ECG group and 19 in X-ray group were confirmed their catheter tip being located in the superior vena cava, and average distance from the catheter tip to the cavo-atrial junction was  $17\pm 2.7$ mm and  $29\pm 4.5$ mm ( $P=0.028$ ) respectively. While 7 patients in IC-ECG group and 9 in X-ray group were confirmed their catheter tip being located below the cavo-atrial junction, and average distance from the catheter tip was  $8.7\pm 1.4$ mm and  $14\pm 2.8$ mm ( $P=0.107$ ) respectively.

**Conclusion:** The accuracy of X-ray assessment of the catheter tip position was questioned by the CT scan. Electrocardiographic guidance has been shown more effective than fluoroscopy to position the tip of central venous devices.

## P077

### Comparison between supine and frog-leg position of femoral vein morphometry in children

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**Introduction:** Femoral vein (FV) is an good option for central venous catheterization, however its challenging to insert a FV catheter by standard landmark-oriented approach in children critically-ill. Maneuvers that increase FV size may improve success rate but its knowledge is limited.

**Aim:** Compare the femoral vein morphometry in supine extended leg position versus frog-leg position in children.

**Methods:** Cross-sectional observational study using ultrasound images to analyze femoral vein morphometry in a Pediatric Oncology Hospital. Images of the femoral vein were obtained in two moments. First each patient was placed supine with legs extending straight, than were placed having their hips flexed to  $40^\circ$  and externally rotated (“frog leg position”) for new measurement. The parameters used were lateral and anteroposterior distances of femoral veins and arteries on both sides and at two positions and distance from the skin to the FV. Two-way analysis of variance (ANOVA) was used to assess the relationship between FV diameter and leg position.

**Results:** Thirty-one patients, ranging from 18 to 208 months, were included. The mean area of the femoral vein was 41 mm<sup>2</sup> on the right side and 43 mm<sup>2</sup> on the left side, increasing to 78 and 93 mm<sup>2</sup>, respectively, when frog position. This increase in area was statistically significant ( $p < 0.01$ ). The average distance from the skin to the vein was 14.2 mm on the right side and 15.2 mm on the left side, this distance decreased to 12.1 and 12.9, respectively, in the frog position ( $p < 0.01$ ).

**Conclusion:** This study demonstrates that frog-position of the leg in children increases the transverse area of the vein and decreases the distance from the skin. This findings suggest that this position may increase success rate and reduce complication rate, and may be useful for children with difficult central venous access or at high-risk of catheter-related complications.

## P078

### Is ultrasound-guided supraclavicular approach to the subclavian vein catheterization easier than internal jugular in children?

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**Introduction:** Central vein catheterization is a challenge in children even in experienced hands, ultrasound (US) guided internal jugular vein (IJV) catheterization is most recommended for children. Recent studies shows the use of the technique of ultrasound-guided supraclavicular subclavian vein to access brachiocephalic vein (BCV) catheterization in children as a favorable approach providing high technical success and less complications. This study proposes to assess the degree of difficulty of vein catheterization by comparing the facility of guidewire progression in the US-guided brachiocephalic vein and internal jugular vein puncture.

**Methods:** Pediatric patients who underwent BCV or IJV catheterization by the Pediatric Surgery Department at a Pediatric Oncology Hospital from December 2014 to March 2017 were retrospectively analyzed. Demographic

features, disease, chosen vein, vein side, guidewire progression and complications were obtained from the charts. Guidewire progression were classified as easy or difficult.

**Results:** A hundred-fifty-five procedures were performed, 68 on IVJ and 87 on BCV. Were evaluated eighty-four male patients (64 girls), 108 with solid tumors (47 with hematologic malignancies) with a median of 66 months of age and 21 kilograms. From IVJ patients, 21 had guidewire progression classified as difficult compared to 10 difficult progressions in the BCV group, showing statistic significance of BCV vein catheterization (p-value: 0,0027). No major complications occurred in both groups.

**Conclusions:** Ultrasound-guided brachiocephalic vein catheterization through subclavian supraclavicular technique is a easier way when compared to internal jugular approach in children. A possible explanation is because BCV has bigger caliber than internal jugular and this technique enables visualization of the needle and the BCV in the longitudinal axis while preventing the vein from compression by the US which associated lead to a decrease in the chances of difficulty of guidewire progression.

#### P079

##### **Tunneled non-cuffed centrally inserted central catheters (CICC) in pediatric oncology: Initial experience**

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**Introduction:** A long-term venous access is essential in children when treating malignant diseases. Tunnelling of central lines is a simple tool that allows simultaneously to achieve both ideal puncturing site and catheter exit, reducing risks of many complications. When use in centrally inserted central catheters (CICC) this technique is particularly useful in children. There is no study focused on pediatric oncology patients.

**Aim:** Evaluate our initial experience with CICCs regarding feasibility, catheter life, complications and reason for removal in children with cancer.

**Methods:** A retrospective analysis of all pediatric oncology patients who underwent tunneling non-cuffed CICC line insertion secured with a subcutaneously anchored securement device, by the pediatric surgery team at our institution from May 2016 to December 2017. Demographic features, primary diagnosis, catheter days, reason for removal and complications were reviewed.

**Results:** Thirty-three CICCs were inserted into 31 children during the 19-month period. Median catheter life was 50 days, ranging from 2 to 522 days, with a total of 2527 catheter days. Complication rate of 5.54 per catheter days was recorded. 25 lines were removed, 4 elective and 7 due to death. Remaining reasons for catheter removal were

infection (9), occlusion (3) and dislodgement (2), with rates of 3.56, 1.18, 0.79 per 1,000 catheter days, respectively. When compared to solid tumors, hematological malignancies had a higher median catheter permanence (53 vs. 38 catheter-days), and Lymphomas showed the highest median with 167 catheter-days.

**Conclusion:** Tunneled CICC lines are feasible and provides reliable long-term intra-venous access in children suffering from malignancies, particularly those with hematological malignancies during induction chemotherapy when the infection rate is higher. Although in our developing country setting better care and proper dressings are important to minimize premature removals and suspected infection. Education for both parents and nursing team and guidelines are needed to improve complication rates.

#### P080

##### **Peripherally inserted central catheters (PICC) by pediatric surgeons for children with cancer: Initial experience of a brazilian center**

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**Introduction:** A long-term venous access is essential in children when treating malignant diseases. Peripherally inserted central catheters (PICCs) have been shown to be a valuable alternative to traditional devices providing central access for this patients. PICCs have been used for many years in developed countries, but there are few studies focused on pediatric oncology patients in developing countries. The purpose of this study was to evaluate our initial experience with PICCs specially with regard to feasibility, catheter life, complications and reason for removal in children with cancer in a developing country pediatric hospital.

**Methods:** A retrospective analysis of all pediatric oncology patients who underwent PICC line insertion by the pediatric surgery team at our institution from March 2016 to December 2017 were enrolled in the study. Demographic features, primary diagnosis, catheter days, reason for removal and complications were reviewed.

**Results:** Fifty-one PICCs were inserted into 49 children during the 21-month period. Median catheter life was 83 days, ranging from 5 to 287 days, with a total of 4392 catheter days. Complication rate of 4.09 per catheter days was recorded. The common reasons for catheter removal were suspected infection, occlusion and dislodgement, with rates of 2.04, 1.59 and 0.45 per 1,000 catheter days, respectively. When compared to solid tumors, hematological malignancies had a higher median catheter permanence (87 vs. 68 catheter-days), and Lymphomas showed the highest median with 11 catheter-days.

**Conclusion:** PICC lines are feasible and provides reliable long-term intra-venous access in children suffering from malignancies. Although better care and proper dressings are important to minimize premature removals and suspected infection. Education for both parents and nursing team and guidelines are needed to improve complication rates.

## P081

### Diffusics: Yes or no

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**Introduction:** The BD Nexiva™ Diffusics™ Closed IV Catheter System was introduced to the CT Department of the Ulster Hospital. The team had reported difficulty in cannulating some of the patient population and were looking for an innovative solution to improve cannulation success. The staff then wished to assess the true benefit of this change.

**Method:** An audit was carried out to review cannulation success rates five months prior to and 9 months post the introduction of the new cannula. The audit looked at first stick success and cannulations that were attempted twice, were unsuccessful or “not attempted”. A time in motion study was used to assess the standard time for cannulation in the department. Costings for the old and new systems were compared.

**Results:** In the first six months following the introduction of the new cannula; first stick success improved by 9% from 80.6% to 89.6%. In the next three months there was a further improvement in first stick success to 92.5%. Unsuccessful cannulations dropped from 85 to 26, from a rate of 8.6% to 4.2% and representing a reduction rate of more than half since introduction. Even more significantly, second attempts fell from 66 to 9, from a rate of 6.7% to 1.4% and representing a 79% rate reduction. Time spent on second attempts reduced from 5 hours 52 minutes to 2 hours 50 minutes in the first six months post introduction. Review of costings showed the new process to cost £2.83 versus the original systems cost £1.80.

**Conclusion:** The BD Nexiva™ Diffusics™ Closed IV Catheter System although more costly; has improved cannulation success and reduced nurse time spent on second attempts.

## P082

### Nurse-led PICC team: Outcomes and lessons learned in the journey of establishing a centre of excellence

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**Introduction:** Patients with long term therapy needed a comfortable venous access that could avoid multiple line

insertions and pricks for therapeutic and diagnostic purpose that they could afford and was comfortable for use even at home or at a local setting. Thus we launched our Nurse Led PICC team in year 2016 Jan. Objective of this study was to look at outcomes of last 2 years, and understand areas of improvement.

**Method:** This is retrospective cohort study of 494 PICC lines inserted by Nurse led PICC team during 2016-2017 in tertiary care teaching hospital in India. Each line inserted is tracked using insertion data sheets and followed through.

**Results:** Our median line days were 49 (interquartile range of 49-103) and most common indication was for Chemotherapy (68.2%) Insertions were under USG guidance (91.9%) all in the upper arm with left basilic (63%) as common site with a first prick success of 70%. Our complication rates were 1.8 per 1000 line days, most being infectious and BSI rates were 1.46per 1000 line days. Around 77 lines were still on, by the end of Dec 2017 and we had lost follow up of 24 lines. Out of reason for removal the commonest was end of treatment (47%).

**Discussion & Conclusion:** We had 25% of patients needing long term antibiotic therapy and hence the line days would be much lesser : 49 vs mean of 129 (Sulav etal 2018) and average of 171.20 (Paula etal 2016). Rate of mechanical complications were lesser (2.6%) compared to other studies, but infectious complications which were seen more in patients with more than 50% IP line days was a concern. PICC lines can be inserted and managed by trained nurses and team has established their repute internationally. Miles to go before we sleep.....

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## P083

### The Daily Review of central venous access as prevention and control of complications: The photographic archive to check in hospital and at home

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**Introduction:** Central venous access positioning and its management represent one of the achievements in a cancer patient. Moreover, the prevention and the control of catheter related complications are the main objectives for any Cancer Institutes. To support the dressing's management of the cancer patients with central venous access, the Institute for Cancer Treatment and Research of BARI in ITALY, proposes a training session and a continuous collaboration between medical and nursing staff, caregivers and patients.

**Method:** During the first dressing the patient is informed about the complications of central venous catheter and the good practices for the dressing's management. Moreover, the patient receives a checklist of the catheter related injury and the devices recommended by international guideline. Then the patient is invited to photograph any change of dressing and to send these pictures to a dedicated email address. The dressing's management outpatient evaluates the pictures and publish the most significant photos on the site of the Cancer Institute.

**Results:** The daily review of central venous access assessed by a photographic archive improved by the dressing's management outpatient in hospital and by the patients at home. This photographic documentation can be updated (daily, if necessary) by the patient or the caregiver in case of suspected catheter related complications.

**Discussion and conclusion:** The introduction of a photographic archive and the collaboration between patient and caregiver improve the prophylaxis of the catheter related complications and promote the good practices in the central venous access management.

## P084

### PICC migration – A problem of the past

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**Introduction:** The number of patients requiring central venous access continues to increase as the management of Oncology and Haematology advances and life expectancy is prolonged. The combination of venous access and Systemic Anti-Cancer Therapy (SACT) results in a large population of patients who have varying levels of care and complications related to venous access.

Infusional Services introduced the Subcutaneous engineered stabilisation device (ESD) as an alternative PICC stabilisation device with a goal to reduce dislodgement and catheter movement associated complications.

**Method:** A cross-sectional analysis comparing all PICCs placed in 2013 were compared to the post-intervention

period beginning 2015. The Subcutaneous ESD was introduced in June 2014 allowing 6 months of learning curve before data collection resumed. All patients were monitored for migration and dislodgement using a PICC History Sheet and an electronic patient database.

**Results:** In 2013, there were 1111 PICCs placed. During this period 66 PICCs had migrated that resulted in catheter replacement, calculated as a 6% re-insertion rate.

In 2015, 1139 PICCs were placed with no migrations or replacements, 0% dislodgement and re-insertion rate. There were no statistically relevant differences between the patients in the two groups based on diagnosis, sex, age or placement of catheter.

**Discussion and Conclusion:** The introduction of Subcutaneous ESDs has resulted in significant benefits for the patient, practitioner and Trust. It eliminated PICC migration and the need for PICC reinsertion. Subcutaneous ESDs have reduced delays to therapy and the potential for increased bed occupancy.

Subcutaneous ESDs offer a safe, effective, and economical alternative of PICC securement for patients who are not only unable to tolerate Adhesive ESDs, but also reduces risks for all PICCs such as migration, dislodgement and consequential thrombosis and infection. Additional prospective research is needed to assess the direct impact of Subcutaneous ESDs on PICC-associated infection, occlusion and thrombosis complications.

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## P085

### Validation of magnetic tracking system method – ECG driven vs. X-ray control and cost implications.

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**Introduction:** A prospective and observational study, focused on validation of the magnetic-ECG method for PICC positioning. To evaluate:

- the primary malposition rate of PICCs inserted with the help of Sherlock 3CG System®,
- the accuracy of the anthropometric measurement,
- the economic cost implications of the whole process.

**Methods:** Study took into account patients aged 16 years and older and excluded patients with atrial fibrillation, atrial flutter or severe tachycardia.

Tools used were “Sherlock 3CG - TipConfirmation System” associated to Site Rite 8 - Bard® ultrasound system and chest radiography. An Excel® sheet has been created for collection of personal data and data related to position of the CVC.

**Results:** 2 malposed catheters on 451 implants: one of which not confirmed by the radiographic check two days later, the other on an obese patient. Anthropometric measurement had an average discrepancy of 0.51 cm from the evaluation of the Sherlock 3CG System®.

Analyzing the PICC implant procedure with the Sherlock 3CG System® control resulted in economic benefit and employee’s time saving.

**Discussion and Conclusions:** The intracavitary electromagnetic path allows a correct and accurate PICC positioning. Use of the anatomical point the repere “third intercostal space parasternal right” results in an underestimated approximation of 0.5 in Picc’s lenght. It results that it is possible to use the fourth rib in the right parasternal junction as an anatomical reference.

The use of Sherlock 3CG System® generates economic savings and guarantees protection for the operator.

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## P086

### The removal of a stuck catheter: Our 5 years experience with Vollmar ring

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**Introduction:** The use of the tunneled central venous catheter is steadily increasing worldwide as a means of vascular access for hemodialysis. The increased use and the extended dwell time are associated with more frequent complications. Among these, one of the worst is the “embedded” or “stuck” catheter. This is when the catheter cannot be normally removed. Below is our 5 year experience using a Vollmar ring as an alternative.

**Method:** In the Vascular Surgery ward in Ancona Hospital, during the five-year period 2013-2017, we dealt with 220 cases of removals and replacements of Central Venous Catheters (CVCs). In 4 cases we experienced problems with stuck catheters, which were solved using a Vollmar ring. This different approach enabled us to remove the CVC thanks to the breakage of the synechiae that kept it stuck to the wall. All procedures were carried out while the patients were sedated but conscious. In all procedures the removal of the stuck CVC was carried out using a Vollmar ring, but in the first case, it was used after a failed Hong’s technique attempt, while in the others it was used as a first choice.

**Results:** All CVCs were successfully removed. The average duration of each procedure was 35 min. There were no major complications or venous damage, even according to the flebography examination.

**Discussion – Conclusion:** In literature different methods were evaluated for removal. Currently the most commonly used technique is endoluminal dilation, also known as Hong’s Technique, recently modified by Quaretti and Galli. It is not possible to establish whether our procedure is superior to this technique but in our experience the use of a Vollmar ring has enabled us to solve the problem in a faster, easier and more cost-effective way.

## P088

### Transfer of technological innovations to nursing practice and contribution to the prevention of infections: The TecPrevInf project

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**Introduction:** Peripheral vascular catheters (PVCs) are considered as risk factors for healthcare-associated infections, however, the magnitude of problem remains nuclear<sup>1</sup>. Medical devices or equipments, combined with training, can promote infection prevention<sup>2</sup>. The TecPrevInf project aims to transfer of innovative technologies into nursing practice (e.g., ultrasound and near-infrared light for vein selection, PVCs dressings and disposable tourniquets), and identify their impact on PVC microbiological contamination.

**Method:** Started in October 2017, and using an action-research approach, the TecPrevInf will be developed in five main activities: i) literature review for theoretical framework; ii) two prospective observational studies, before and after the implementation of technologies to assess their impact on PVC microbiological contamination; iii) conduct discussion panels and advanced training workshops for the

transferability of technologies; iv) conduct a randomized controlled trial to compare the effectiveness of technologies for vein selection with the traditional method; v) elaboration of an algorithm for intravenous catheterization and development of an institutional and national dissemination program.

**Results:** A systematic review protocol was submitted to the Joanna Briggs Institute for registration, focusing on the effectiveness of vein visualization technologies. A scoping review of the literature was performed focusing on the practices associated with tourniquet use and associated microbiological contamination. Several data collection instruments were developed and presented in a meeting with the nursing team from a Cardiology ward of a large tertiary hospital in central Portugal, which will constitute the selected clinical setting for the prospective observational study.

**Discussion & Conclusion:** In spite of the incessant PVCs-related innovations, healthcare institutions do not always recognize and acquire them. The project will promote knowledge translation between academic and clinical settings, favoring the incorporation of innovations into clinical practice. Additionally, this synergy is expected to enable the creation of a translational research network to future research projects in this scientific domain.

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## P089

### Seven years of evolution of the intravenous therapy team at the ‘Hospital Universitario Donostia (HUD)’

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**Introduction:** The constitution of the intravenous therapy team (ITT) in 2011 implied an awareness of the complications related to PICCs (Peripherally inserted central catheter), such as deep vein thrombosis (DVT) and catheter-related bacteremia (CRB), that were treated without unified professional criteria.

In this context, important collaborations are established with different health professionals and it is the starting point of our project “Intravenous Therapy Team Management Support Group” (ITT-MSG), which is very

beneficial for patients and professionals as for the hospital and the community in general.

**Methodology:** Establishment of inter-hospital circuits.

- Creation of protocols for the management of PICC thrombosis and suspected infection.
- Creation of a database for the collection of information: medical history, analytical data, characteristics of the catheter and complications.

**Results:** Reduction of complications related to PICC

- Improvement in the catheters global maintenance.
- Reduction of unnecessary withdrawals.
- Increase in the number of inserted PICC per year
- Creation of a Committee of vascular accesses in which they participate: Interventional Radiology, General Surgery, Infectious Diseases, Medical Oncology, Preventive Medicine, Anesthesia, Evidence-Based Medicine, Home Hospitalization, Primary Care, Expert in Research Methodology in Health Sciences and ITT.

**Conclusions:** The creation of the ITT-MSG has achieved a comprehensive and individualized assistance covering the entire process from the insertion, monitoring and withdrawal of vascular accesses optimizing the management of resources.

This is reflected in the increase of annual implantations of PICC, which went from 164 in 2011 to 1088 in 2017, and in the reduction of the number of DVT (6.1% in 2011 to 1.9% in 2017) and CRB (0.3% in 2015 to 1.7% in 2017). Robust data on the activity and needs of the ITT have been obtained, which aim to prevent or reduce complications and offer a quick and effective solution.

## P090

### Central vascular catheters for hemodialysis: A five years pediatric nephrology center experience

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**Introduction:** Central vascular access is mandatory for extracorporeal dialytic treatment in children. Device selection is hard in pediatric population: dialysis requires large catheters in spite of the small veins size of pediatric patients.

**Aims:** The authors report a retrospective analysis of implantation and use of hemodialysis catheters from 2012 to 2017 in a single pediatric nephrology center.

**Materials and Methods:** 69 children (29 females and 40 males; aged 1 day to 13 years) undergoing hemodialysis

were observed. Their body weight varied from 3.4 kg to 85.0 kg. The children were divided into two subgroups according to therapeutic needs (8 chronic hemodialysis; 61 acute hemodialysis). The veins chosen for the implant were: right internal jugular vein (49), right anonymous vein (15), femoral vein (5). Twenty long-term cuffed and tunneled catheters and 49 short-term catheters were implanted. All devices were two-way, sized from 5Fr to 11Fr. Functional duration and secondary complications were recorded.

**Results:** Devices were used for a total of 2810 days. Globally, secondary complications were 3.5 % catheter-days: 1 % for tunneled catheters, and 14 % for non-tunneled catheters. In the latter group the rate of complication was respectively 30 % catheter-days for femoral vein catheters 9 % for jugular vein catheters and 5 % for anonymous vein devices.

**Conclusions:** In children, implantation of tunneled central catheters for hemodialysis in the large veins of the cervico-thoracic district, preferentially on the right, reduced the rate of secondary complications. Subcutaneous tunneling in the sub-clavear region provided stability and efficiency of the catheter, during the dialytic treatment. Non-tunneled catheters showed a high rate of displacement, in particular when located in femoral vein, whereas anonymous vein position was the most stable and secure.

## P091

### Helping patients stay at home

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**Introduction:** Best practice recommends peripherally inserted central line catheters (PICCs) / Midlines be placed using ultrasound in the upper arm. However, it's very difficult for patients to self-administer their treatment. The development of Bionector TKO Self-Administration Set allows patients to self-administer their treatment at home saving staff and hospital bed days and improves the patient experience.

**Method:** To minimise catheter occlusions, the hospital uses Vygon's Bionector TKO; a needle free device with a valve to stop catheter tip reflux. Vygon were approached and together they developed a prototype.

**Results:** The line extension line now known as Bionector TKO SAS means more patients can be discharged home and followed up in clinic.

The evidence from patients has proved to be an overwhelming endorsement of the new extension line allowing them the opportunity to get on with normal life.

The financial benefits for the hospital are considerable. The new treatment regime saves clinician time to administer the therapies as well as the cost of a hospital bed.

To evaluate the savings made:

Department of Health stated NHS hospital stay (2017) = £400 per day

<https://data.gov.uk/data-request/nhs-hospital-stay14> days IVAB x £400 bed per day = £5600 per patient

10 patients over 3 months generates a saving of £56,000

**Discussion & Conclusion:** As a result the Bionector TKO SAS is available UK wide so patients may benefit from the innovation designed to improve patient care and make efficiency savings. This can be demonstrated by 614 days hospital bed days being released while patients self-administered their treatment at home. The home delivery system also means that patients have consumables and medications delivered at home further simplifying treatment and management.

## P092

### Patients' experiences with picc-lines: The papic study

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**Introduction:** Peripherally inserted central venous catheters (PICC-lines) are inserted in the patients' overarm, guided by ultrasound. They are used for medium to longterm intravenous treatment with fluids, nutrition or medication, as well as for blood-sampling, and can stay in place for up to one year [1]. PICC-lines are relatively new in Norway.

Patient experiences is an acknowledge parameter for healthcare quality, and gives an opportunity to improve treatment and care, to meet patients' expectations and guide strategical decisions [2]. The aim of this study is to explore patients' experiences with PICC-lines, as well as factors affecting these experiences such as age, gender, health-related quality of life (HrQoL) or comorbidity.

**Methods:** The study is a collaboration between Akershus University Hospital, Sørlandet Hospital and Østfold Hospital (885000 inhabitants in total). The study has a mixed-method design: 1) Use of a questionnaire [3] consisting of 14 questions related to the dimensions 'information', 'discomfort', 'unsecurity', and 'daily life restrictions'. The questionnaire include the EuroQoL-5 dimension-3 level questionnaire [4]. Comorbidity will be calculated by using the Charleson comorbidity score [5]. Inclusion criteria: patients above 18 years of age, able to give their oral and written consent to participate. 2) In-depth interviews. 3) Longitudinal study, asking patients to complete a questionnaire after two months as well.

The study has been approved by the Norwegian regional committees for Medical and Health Research ethics, as well as the Norwegian Centre for Research Data.

**Project plan:** Data sampling planned to the end of December 2018. The study has received fundings from the Norwegian Nurses Association. Applications for fundings to a PhD-candidate to complete the qualitative data-sampling, analysis and publication processes are ongoing.

**Preliminary findings:** Preliminary findings indicate that patients prefer a PICC-line rather than traditional venous catheters. They experience few complications or limitations in their daily activities.

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### P093

#### A modified technique using both color doppler ultrasound and Site-Rite V in complex cannulation of PICC: A four-year experience

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**Introduction:** Ultrasound guided venipuncture and catheterization has significantly increased the success rate of PICC catheterization. But limitations still exist: color doppler ultrasound has an advantage in vessel diagnosis but is inconvenient for puncture without a director; Site-Rite V makes an accurate puncture but is poor at vessel diagnosis for its black-and-white imaging system. A combination of these two techniques may benefit patients with extremely complex vessels.

**Methods:** Clinical patients with difficulty of PICC catheter in our hospital from December 2013 to December 2017 were collected, who were assessed by the IV team members. The color ultrasonic diagnostic instrument was employed to find the best venous vascular access, through the way of “man-machine” cooperation. After locating and evaluating target vessels, Site Rite V or color doppler ultrasound was used to guide puncture.

**Results:** In total of 97 patients, 5 were recommended venous access port (PORT) and 2 were recommended for central venous (CVC) technique. Among the remaining 90 patients, 83 were cannulated successfully in one time (83/90, 92.22%), and 7 succeed experiencing twice punctures (7/90, 7.78%). The overall success rate was 100%.

**Discussion & Conclusion:** As suggested by this research, the success rate of catheterization was greatly improved because of the joint application of the color doppler ultrasound and Site Rite V. Catheterization guided by both color doppler ultrasound and Site-Rite V, which complemented each other

functionally, has a high precision and less damage, and is worthy of clinical popularization and application.

### P094

#### Team implementation for percutaneous catheter placement as a less invasive strategy for compliance with intravenous therapy

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Catheter patrol: performance indicators

Catheter Patrol was created in 2008 as an additional strategy for the accomplishment of intravenous therapy focused in the placement of percutaneous catheters by direct puncture. Descriptive, observational, and retrospective cohort research. Objective: to assess the outcomes of the implementation of the catheter patrol between 2009 and 2013. There were analyzed the existence of factors associated with complications and costs in a pediatric public Hospital. Inclusion criteria: catheters placed in intermediate care unit by catheter patrol nursery, patients between 31 days of life and 17 years old with completed individual follow-up record. Results: 2121 catheters, 1.6catheter/patient, median age 6 years old, median stay 9 days, frequent complications: obstruction 27.19%, displacement 25.94%, rupture 11.76%, pulled up by the patient 11.08%, bsi 1.62 to 2.80 x 1000 days/catheter, rate of complication incidence P=0.002 in younger patients 39.92 days/catheter, and older than 1 year old 31.14 days/catheter, insertion site : P<0.001 between mi 26,67 days catheter ms 36,98 days catheter and jugulars 38,36 days catheter french and complications related 4fr 12 17 days catheter 3 fr 24,25days catheter, 2fr 42,27 days catheter with p=0.000 and p=0.16 among number of lumen conclusion: complications are related to care age and support of the patient care protocols should take into consideration these key factors it is important to include an assurance device in accordance with the needs and features of the patient the choice of a 3fr catheter or grater may reduce complications this is no applicable in children with vascular access that do not allow the catheter to be in contact with the intima due to its diameter as a predisposing factor for thrombosis incidence the costs of percutaneous catheter placement is u\$ 100 in comparison with u\$ 400 of the picc placement although not always percutaneous catheter replace picc

### P095

#### Development of a needle for peripheral intravenous catheters to improve vein puncture using in vitro models

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**Introduction:** The first attempt at puncture using a peripheral intravenous catheter (PIVC) is frequently unsuccessful. One suggested risk factor for this is advanced patient age. With the loss of subcutaneous fat and thinning of the skin in older adults, introduction of a needle into a vein can cause the vein to deform or move, making placement of a vascular access device challenging. We have developed an ultra-sharp needle with a very thin tip for older patients. Here, we evaluated this ultra-sharp needle using in vitro models.

**Method:** Our ultra-sharp needle in PIVC-22G (ultra-sharp needle, n=5) was compared PIVC-22G (control, n=5) by a resistance force test and tube puncture test. The resistance force test measured the load when the needle tip penetrated a polyethylene sheet (thickness 50 $\mu$ m) at 30° and a speed of 30mm/min. The tube puncture test evaluated whether the needle could puncture a polyvinyl chloride (PVC) tube (as a vein model) at a speed of 50mm/min and at angles from 10° to 35° (at 5° increments).

**Results:** The average resistance forces produced by the ultra-sharp needle and control groups were 58.5 $\pm$ 2.1mN and 93.8 $\pm$ 3.2mN, respectively (P<0.001). In the tube puncture test, the puncture success rate was lower at lower angles in both groups, and the minimum angle at which puncture was successful for all samples (5/5) was 15° and 25°, respectively.

**Discussion & Conclusion:** Ultra-sharp needles produced lower resistance forces and punctures at smaller angles than PIVC-22G. Although we examined these effects in an in vitro model, the vein model could reproduce deform and move. Our results therefore suggest that ultra-sharp needles could improve the success rate of first puncture attempts. Further studies are required to demonstrate the effectiveness of this needle in clinical settings.

## P096

### Development of the central venous catheterization training device which reveals appropriate advance of the needle

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**Introduction:** Central Venous Catheterization (CVC) is an essential procedure in the care of complicated patients, both on inpatient wards and in the emergency department. CVC causes complications at a few hundredth of a percent, and some of the complications, such as massive hemorrhage, are life-threatening. Therefore, adequate CVC training to clinicians is necessary for patient safety. Ultrasound (US)-guided CVC reported to reduce the rate of complication. We aimed to provide the training to advance a needle straight along an ultrasonic probe for safety vascular puncture.

**Method:** We developed original evaluation device made by 3D printer. This device has a shape like an ultrasonic probe. A pole installed in the center of the device forms an electric circuit to a needle which connected with the cable, when the needle touches the pole. Then electricity turns on, and a lamp installed on the top of the device lights up. On the training using this device, we use sponges to puncture instead of the simulator contained gel inside. Using this device, we checked proficiency in the skill of trainees in Gunma University Hospital from Apr 2017 to Jan 2018.

**Results:** We checked 72 various level's trainees including residents and senior doctors. When they succeeded puncture, the lamp lighted up. So they could assess their ability objectively. All trainees trained using this device in CVC hands-on seminar, could improve their venipuncture skill on the simulation. Trainee's postures of the puncture were also improved after training using this device repeatedly.

**Discussion & Conclusion:** We developed the training and evaluation device of venipuncture skill. By using this convenient device, we can recognize whether the location of puncture and the direction are correct. We expect that, using this device increase effectiveness of the CVC training and contribute patient safety.

## P099

### Observational tool for research of ultrasound guided peripheral catheter barrier and securement dressing

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**Purpose/Design:** The purpose of this qualitative observational tool is to assess the ease of use of a barrier and securement dressing in the clinical setting during ultrasound guided peripheral catheter insertion (UltraDrape™ barrier and securement dressing, Parker Laboratories, Fairfield, NJ).

**Methods:** The tool is designed for application in a hospital cohort of difficult access intravenous patients selected for ultrasound guided insertion of a peripheral or midline intravenous device. This validated psychometric item scoring Likert five-scale tool facilitates collection of data from inserting clinician oral responses tabulated by a researcher during the procedure. Data provides the opportunity for analysis with rank, median and ranging results.

**Results:** Results of the observational study are analyzed and converted into a continuous variable with a calibrated line to indicate responses to each question. Responses to evaluation questions of intuitive use, application ease, facilitation of aseptic technique, image quality with ultrasound, comparison with probe cover and time savings, avoiding needlestick, gel management, need for assistant, successful procedure and recommendations fall into

performance categories. Comments on the tool are included as an evaluation of support of the key elements or reflective of difficulties in the procedure.

**Limitations:** Responses associated with qualitative research are subjective in nature, based on opinion and judgment of the individual. Qualitative assessments present limitations in the dependence on individual skill of the researcher and are easily influenced by personal bias. Likert scales contain multiple items and are therefore likely to be more reliable than single item. (1,2)

**Conclusions:** The results will suggest or deny that clinicians found the dressing intuitive, easy to apply and use with gel and ultrasound facilitating the aseptic non-touch technique.

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## P101

### Patient complexity and risk factors associated with phlebitis

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**Introduction:** Phlebitis is a common adverse event of peripheral venous catheter<sup>1,2</sup>. Prevention of complications must focus on optimizing use of these devices and identify the risk factors.

The aim of this study was to identify care complexity individual factors associated with phlebitis.

**Method:** An observational analysis of a retrospective cohort of adults hospitalized at a tertiary hospital from January to December 2016. All episodes of adult patients with a completed nursing assessment form were recruited retrospectively and were classified into two groups: those who had peripheral venous catheter (PVC)-related phlebitis and those who had not. Care complexity individual factors recorded with ATIC terminology on nursing assessment form were categorized into five domains: mental-cognitive, psycho-emotional, socio-cultural, developmental and comorbidity-complications<sup>3,4</sup>. PVC-related phlebitis, care complexity individual factors and other demographic and clinical characteristics were recruited in the electronic charts. Statistical analyses were performed using SPSS version 18.0 software.

**Results:** Of 16,925 episodes of hospitalized patients, 1,440 (8.5%) had PVC-related phlebitis during hospitalization. Gender and age were similar between two groups. Patients who had PVC-related phlebitis were more often

admitted to medical ward. Also, patients who had PVC-related phlebitis more frequent had chronic liver disease and more days of hospital stay (P-value <0.05). Independent care complexity individual factors associated with PVC-related phlebitis were hemodynamic instability, high-risk of hemorrhage, uncontrolled pain and transmissible infection. The goodness-of-fit of the model was 0.92. The frequency of PVC-related phlebitis increased with increasing number of care complexity individual factors and reached >54% with at least two or three risk factors (chi-squared for trend P<.001).

**Conclusion:** Identify care complexity individual factors during the admission can predict adverse consequences such as PVC-related phlebitis. Furthermore, it can help to implement strategies for optimize use and type of intravenous catheter on hospitalized patients.

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## P102

### Detection quantification of adverse events associated with the insertion and replacement of short peripheral vascular catheters through a Check List in areas of Clinical-Surgical Hospitalization. July 2016 to December 2017

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**Introduction:** More than 1 billion CVP are placed in hospitalized patients. The overall rate of phlebitis is 10.3%. This study is based on the increase of thrombophlebitis, phlebitis, infiltrations and obstructions in patients hospitalized with a CVP in clinical sectors, using a Check List for the insertion of the CVPCs.

**Material and Methods:** 1) Check List, Insertion and CVPC replacement sheet. 2) Direct observation of insertion sites. Population: Patients with CVPC and its replacement, related to thrombophlebitis, phlebitis, infiltration or obstruction. Age: 19-104 years. Study: Descriptive,

Observational and Cross-sectional. Period: July 2016-December 2017.

**Results:** CVPc of PTFE 973 and Closed System Pressed 636 were inserted, 1608 Check List of Insertion was made, including those of CVPc replacement. Thrombophlebitis (TBF) (18) evaluated by Clinical Physician, 1/18, Infectious TBF, without microorganism rescue, in the forearm of the MSD, all patients required > days of hospitalization, the age of 38-94 years, 11/18 women, 4/18, required subsequent studies as eco dopler of the member affected, all received treatment as physical means and the use of antimicrobial in infectious TBF. Flebitis Química: 250, phlebitis / 1608 check list, I represent 15,54% adverse events. Phlebitis of PTFE CVPc; 17,98%, (175/973) the closed pressed system, 11,63%, (74/636). Infiltrations: 10,75%, (173/1608). PTFE catheter 12,22% and (119/973) pressed closed system 8,33% (53/636) Occlusions: (55/1608), 3,42% PTFE The overall and SCP 22/636=3,45%, adverse events were: 518/1608, (32,21%). The most used CVPc site is the upper right arm and the left hand arm. Gauge nº 20.

**Discussion:** The available evidence is insufficient about the use of the CVPc insertion checklist, and if the 15,54% of phlebitis is high or low, there are prevalence studies in some countries, which indicate the values of phlebitis in a range of 10.3% or more.

**Conclusion:** During the study period improvements were implemented in different processes; Work must be continued to reduce these events.

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## P103

### Applying MAGIC recommendations in the indication of peripherally inserted central venous catheters: retrospective analysis on a private hospital in Brazil

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**Background:** Peripherally inserted central venous catheters (PICC) are increasingly being used to provide central venous access and PICC complications lead to increased mortality and cost. The presence and proliferation of vascular access nursing in hospital settings has been identified as a potential contributor to growing demand, and possible overuse, of PICC lines. We aim to evaluate if PICC indication is appropriate, based on the Michigan Appropriateness Guide for

Intravenous Catheters (MAGIC), in a 300-bed Brazilian Hospital.

**Methods:** We analyzed retrospectively the PICC inserted in intensive care units (ICU) and non-ICU setting from January to July/2017. These catheters were evaluated within each scenario through the mobile app – The Michigan MAGIC – and each one were categorized as appropriate, neutral, inappropriate or disagreement.

**Results:** PICC were inserted in 605 patients (49% male and 51% female), with a mean age of 73 years (03 to 113), 53% in non-ICU settings and 47% in ICU. The right arm was chosen in 69% of the cases and the most common vein punctured was basilic (66%), followed by brachial (33%) and cephalic (1%). According to proposed duration of infusion and type of infusate, 95% of all PICC inserted (575) were considered appropriate. There were 14 cases (2%) classified as inappropriate (peripherally compatible infusate) and 16 (3%) classified as disagreement (difficult venous access with duration of infusion  $\leq$  5 days).

**Discussion & Conclusions:** In our institution, the selection of PICC is based on specific and appropriate indications for this device. This is a very important step to avoid the potentially serious complications of infection and/or thrombosis. Indeed, PICCs should be aggressively discontinued when no longer absolutely needed.

## P104

### Peripheral venous catheter related-infections in a reference hospital in Spain: preliminary results of a cross-sectional study

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**Introduction:** Catheter-related bloodstream infections (CRBSI) are catastrophic yet preventable events for patients. The contribution of peripheral venous catheters (PVCs) towards these infections is emerging. However, its role in our setting has not been determined. We aimed to estimate the incidence of PVC-related infectious events at Manacor hospital (Spain) within a wider quality improvement initiative.

**Methods:** Tips from all PVC removed during December 2017 and January 2018 in five study wards were cultured semiquantitatively. The study population included all hospitalised patients on medical and surgical wards, excluding critical care, paediatrics and maternity wards (n=1313). Clinical, microbiological and ward information was collected on PVC removal. CRBSI was defined per international guidelines (ie, Centers for Disease Control and Prevention, USA). Data was analysed descriptively.

**Results:** 711 tips were cultured, with 5.8% (41/711) positive isolates. Most frequently isolated microorganisms were *Staphylococcus spp* (*S. epidermidis* 29/41, 70.7%), *S. aureus* 2/41, 4.9%, *S. hominis* 2/41, 4.9%), and *Acinetobacter baumannii* (1/41, 2.4%). 1 *S. aureus* isolate was methicillin-resistant. 53.6% (22/41) positive cultures were obtained from patients with local signs and symptoms compatible with catheter-related infection (CRI) and 2.4% (1/41) were compatible with CRBSI and that clinical signs improve within 48 hours of catheter removal (density-adjusted incidence for hospital stays of 16.7 PVC-CRI/1000 hospital-stays and 0.76 PVC-BSI/1000 hospital-stays respectively) and no patients were diagnosed CRBSI with a bacterial growth concordant in tip and blood cultures. Most cases responded favourably to catheter removal and management.

**Discussion & Conclusion:** Although PVC-related BSI had low incidence in our setting, an important number of patients with positive tip cultures had no symptoms. The volume of PVC use amplifies its importance in terms of morbidity, mortality, and patient safety.

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## PI05

### Good arguments for establishing an IV-team

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**Introduction:** Bloodstream infections related to central-line catheters are among the most serious nosocomial infections. Catheter-related infections are associated with increased morbidity, mortality, length of stay and increased economic costs. If central-line catheters are handled correctly, the number of infections can be decreased.

**Aims:** To observe and closely monitor the central-line catheters with respect to infection, documentation and handling. To establish an IV-team performing central-line catheter rounds. To focus on the possibility of using alternative IV-access.

**Methods:** 68 patients who had a central-line catheter were included. The IV-team focused on: number of catheter

infections; whether the indication for the central-line catheter was relative or absolute; daily evaluation of reasons for maintaining the catheter; type, location, complications, documentation and daily care of the catheters. Furthermore, the nurses were asked what the IV-teams tasks should be.

**Results:** There were two infected catheters, equivalent to 0.5 – 5.4 per 1000 days of catheter. Central venous catheters showed a non-significant increase with regard to infection compared to PICClines. Patients with PICClines showed a higher CCI-score and mortality. 37% of the patients had a central-line catheter inserted on a relative indication. In 66% of the journals the type of catheter was documented, an increase of 49% compared to baseline. Documentation of the handling of the catheter and daily evaluation of reasons for maintaining the central-line catheter could not be retrieved in the electronic patient journal. Nurses suggested that the IV-teams tasks should be to provide information, education and engage in dialogue.

**Discussions and conclusion:** Establishing an IV-team seems to have resulted in an increase in documentation and an increased focus on handling the central-line catheters. With regard to relative indications for central-line catheters, the IV-team could prove to be an important factor promoting less invasive options.

## PI06

### Cumulative incidence of complications in adults with peripheral venous catheter

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**Introduction:** The insertion of a peripheral venous catheter (PVC) is not free from complications, among the most common being phlebitis, infiltration and obstruction of the PVC<sup>(1-2)</sup>. The occurrence of a complication results in removal and insertion of a new catheter, discomfort of a venous puncture, stress to the patient and nursing staff, an increase in time of nursing care, as well as putting patient safety at risk<sup>(3)</sup>. The high incidence of complications evidenced by Salgueiro-Oliveira<sup>(1)</sup> at a medical service in Portugal, the implementation of new nursing practices and the need to assess the results of quality indicators related to the PVC over time has motivated the implementation of research with the objective of analyzing the cumulative incidence of complications related to the PVC in adults.

**Method:** Cohort study that followed 110 patients in medical service in Portugal, during 82 consecutive days, between July and September/2015. Patients with PVC were included. Descriptive statistics using SPSS was used.

**Results:** complications in PVC: obstruction (50.0%), infiltration (45.5%), accidental removal of the catheter by the patient (41.0%), phlebitis (35.5%), fluid leakage on the

insertion site (19.0%), pain on the insertion site (11.8%) and hematoma (0.9%).

**Discussion & Conclusion:** Obstruction, infiltration, accidental removal and phlebitis were the complications with the higher incidence. Despite phlebitis having been the focus of intervention in an investigation<sup>(1)</sup> and it being one of the most studied complications<sup>(1-3)</sup>, it presented high incidence in this research. Analysis of risk factors for these complications is suggested in order to subsidize the implementation of nursing care in the context of prevention and to ensure the criteria for selection and indication of a venous catheter<sup>(4)</sup>.

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## P107

### Is it worth having a dedicated infusion therapy nurse? Impact on peripherally inserted central venous catheter-associated bloodstream infections rates and costs

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**Introduction:** Peripherally inserted central venous catheters (PICC) are increasingly used in healthcare services and bloodstream infections associated to them (PICC-BSI) leads to increased mortality and costs. We aimed to compare direct costs of PICC-BSI in a 300-bed Brazilian Hospital, before and after employing a dedicated infusion therapy nurse (ITN).

**Methods:** After May/2016, a dedicated ITN for adult patients was admitted to perform the following functions: to apply evidence-based indications for vascular access and avoid its potential overuse, ultrasound-guided PICC insertion, nursing staff capacitation in PICC maintenance, patient education and empowerment for catheter care, management of peripheral line indicators. PICC-BSI episodes occurred before (Jan/15 to May/16) and after (Jun/16 to Nov/17) ITN were detected by active surveillance by Infection Control Team, according to National Healthcare

Safety Network criteria. PICC-BSI costs were measured considering an extra length of stay and antimicrobial therapy of 7 days, cost of PICC and laboratorial inputs for BSI detection. Values were converted from Brazilian Real to US dollar (quotation updated 02/15/2018).

**Results:** There were 07 PICC-BSI before and 05 after ITN, which correspond to 0.7 and 0.4/1000 PICC-day infection rate respectively (reduction of 43%). After May/2016, there was an increase of 50% in PICC use per patient-day (8% and 12%). The average PICC-BSI direct cost was \$9,900 - extra length of stay: \$7,492; antimicrobial therapy: \$1,095; cost of PICC: \$765; laboratorial samples: \$548.

**Discussion & Conclusions:** In this study, we evaluated only the direct and estimated costs of PICC-BSI, but the value should be much higher if we consider indirect costs such as healthcare workers hours, complications and the need for transfers to intensive care units. In our hospital, a dedicated ITN nurse contributed to reduce the rate of infection, generating savings for the service and contributing to the quality of care and patient experience.

## P108

### Risk factors associated with first-time insertion success for peripheral intravenous cannulation in the Emergency Department. A multicentre analysis of patient, clinician, and product characteristics

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**Introduction:** The peripheral intravenous catheter (PIVC) is omnipresent in the Emergency Department (ED). This study aimed to identify the incidence and risk factors for first-time insertion success (FTIS).

**Methods:** Observation of PIVC insertions in two EDs occurred using a validated tool regarding patient, clinician, and product variables. We identified predictors of FTIS using univariate and multivariate logistic regression modeling. We created 4 models: patient predictors only; clinician predictors only; products predictors only; and all variables model.

We assessed each model's performance using area under the receiver-operator characteristic curve. Additionally, model sensitivity, specificity, negative and positive predictive values were calculated.

**Results:** Of 1,201 PIVC insertions were inserted in 879 patients. The mean age was 60.3 (SD 22) years with slightly more females (52%). The FTIS rate was 73%, with

128 (15%) requiring a second attempt, and 83 (9%) requiring three or more attempts. A small percentage (3%) had no recorded number of subsequent attempts. The model considering all variables had greater discriminative ability than the others. FTIS was related to the following patient factors: age (for a one year increase in age: Odds Ratio [OR] 0.99, 95% confidence interval (CI) 0.983-0.998;  $p=0.0097$ ); and target vein palpability: (always palpable vs. never palpable: OR 3.53 95% CI 1.64-7.60; only palpable with tourniquet vs. never palpable: OR 2.20, 1.06-4.57;  $p=0.0014$ ). Clinician factors related to FTIS include: clinicians with greater confidence ( $p<0.0001$ ) and insertion experience (301-1000 versus  $<301$ : OR 1.54 95% CI (1.02-2.34);  $>1000$  vs.  $<301$ : OR 2.07 95% CI 1.41-3.04;  $p=0.0011$ ). The final model has a sensitivity of 74.26%, specificity of 57.69%, positive predictive value of 82.87%, and negative predictive value of 44.85%.

**Conclusion:** FTIS can be improved. A clinical decision rule that matches patients, who have no palpable veins and are older, with clinicians with greater confidence and experience, will likely improve FTIS.

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## PI09

### From insertion to removal of Emergency Department inserted peripheral intravenous catheters. A multi-centre survival analysis of an admitted cohort

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**Introduction:** The majority of patients admitted to hospital via the Emergency Department (ED) will do so with a peripheral intravenous catheter/cannula (PIVC). Many PIVCs develop post insertion failure (PIF).

**Methods:** We analysed data from a prospective clinical cohort study of ED-inserted PIVCs admitted to the hospital wards. The antecedents to PIF identified were: Infiltration; Occlusion; Pain and/or Peripheral intravenous assessment score (PVAS)  $>2$  (The hospital's assessment chart to monitor PIVC phlebitis); Dislodgement (i.e. Accidental or Securement device failure); Patient pulled it out. Independent predictors of PIF were identified with Cox proportional hazards regression modeling.

**Results:** In 391 patients admitted from two EDs, the rate of PIF was 30% ( $n=118$ ). Mean PIVC dwell-time was 37.5 hours ( $<1\text{hr}-166\text{hrs}$ ). Of the PIVCs that failed, infiltration and occlusion combined were the most common causes of PIF ( $n=54$ ; 46%). The following variables were associated with increased PIF: being an older patient (for a one year increase: HR 1.02 95% CI 1.01-1.03  $p=0.0001$ ); being categorised as 1-2 in the Australian Triage Score compared to a categorization of 3, 4, or 5 (HR 2.04, 95% CI 1.39-3.01,  $p=0.0003$ ); having an ultrasound guided (USG) PIVC (HR 6.52, 95% CI 2.11-20.1,  $p=0.0011$ ); if the PIVC was inserted by a medical student ( $p=0.0095$ ); when aseptic non-touch technique/key parts protected approach is not used at insertion ( $p=0.0326$ ); and when PIVCs are inserted in a patient's ante cubital fossa or back of hand compared to upper arm ( $p=0.0337$ ).

**Conclusion:** PIF remains at an unacceptable standard in both traditional and ultrasound inserted PIVCs.

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## PI10

### Standard cleaning vs a disinfection cap for the decontamination of needle-free connectors

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**Introduction:** The efficacy of decontamination is one factor attributed to the level of infection risk associated with needle-free connectors. However, the optimal decontamination method for such devices is still unresolved. The objective of this study was to determine if a continuous passive disinfection cap is as effective as standard cleaning

for the microbial decontamination of injection ports of two types of needle-free connectors.

**Method:** The injection ports of needle-free connectors were inoculated with *Staphylococcus aureus* and allowed to dry. Disinfection caps containing 70% (v/v) isopropyl alcohol (IPA) were attached to the connectors for one, three or seven days and were compared with needle-free connectors cleaned with wipes containing 2% (w/v) chlorhexidine gluconate (CHG) in 70% (v/v) IPA. The number of *S. aureus* remaining on the needle-free connectors was determined. Median log<sub>10</sub> reductions and 95% confidence interval (CI) were calculated and data analysed using the Mann-Whitney test.

**Results:** The application of the disinfection cap resulted in a significantly higher reduction in the number of surviving *S. aureus* than the wipe containing 2% (w/v) CHG in 70% (v/v) IPA. Indeed, a >5 Log<sub>10</sub> reduction in CFU was achieved at each time point.

**Discussion & Conclusion:** The disinfection caps resulted in a significantly higher reduction in *S. aureus* on the injection ports when compared to the use of a wipe containing 2% (w/v) CHG in 70% (v/v) IPA. These results corroborate the lower rates of central-line associated bloodstream infection (CLABSI) demonstrated with the use of disinfection caps in clinical studies.

### PIII

#### Laboratory evaluation of chlorhexidine delivery into donor skin from the Biopatch® and 3M™ Tegaderm™ CHG IV Securement dressings

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**Introduction:** Intravascular catheter skin insertion site dressings, incorporating chlorhexidine gluconate (CHG) are designed to reduce the risk of catheter-related bloodstream infection. However, the efficacy of these dressings in delivering CHG onto and into the upper layers of the skin, (which may determine their antimicrobial efficacy) has not been studied.

**Method:** CHG delivery onto human skin from an aqueous gel (3M™ Tegaderm™ CHG IV Securement dressing) and dry urethane disk (Biopatch®) was determined using a donor human skin model. After 24-h application of CHG containing dressings onto skin, the concentration and depth of CHG skin permeation was determined in sequential skin sections.

**Results:** Residual CHG in skin samples without any dressings applied, was detected. This originated from the donor patient's pre-operative skin antiseptics. Additional CHG was detected after application of CHG-containing

dressings. There was no significant difference between the two dressings in terms of the amount of CHG delivered overall from the surface to skin depth of 2000µm, although a higher concentration was present in the urethane disk. The percentage of applied CHG that was delivered into the skin was over 10-fold higher after application of the aqueous gel in comparison to the disk. A greater percentage of the CHG applied was delivered into the top 100µm of skin from the aqueous gel as compared to the urethane disk (p=0.043). The estimated level of CHG in the top 100µm of skin reached over 160 mg/L with the application of the aqueous gel and 90mg/L following the urethane disk.

**Discussion & Conclusions:** Permeation of CHG into full thickness donor skin from an aqueous gel or urethane disk were similar although the disk initially contained a higher concentration of CHG. These results highlight that not only the amount of CHG applied but also the method of delivery are important considerations when designing antiseptics.

### PII2

#### Use of peripherally inserted central catheters in children with cardiac disease

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**Introduction:** The peripherally inserted central catheters (PICC) are vascular access devices (VAD) that are increasingly being used in the pediatric population. The study aimed to present our experience with the use of PICC in critically ill children with cardiac disease.

**Method:** A prospective observational study was conducted at Santo Antonio Children's Hospital at the Santa Casa de Misericórdia de Porto Alegre, between October 2015 to December 2017. 148 PICC placements were requested in critically ill children with cardiac disease. However, 66 were contraindicated, 49 were successfully inserted, and 33 were failures. All PICCs were inserted by a member of the Vascular Access and Infusion Therapy Team. Patients were prospectively followed until PICC removal, death, or 60 days after insertion. The primary outcome was PICC removal due to complications.

**Results:** A total of 49 PICC were placed in 47 children with cardiac disease during the period. 49 PICC were in place for a total 617 catheter-days (median time, 12.6 days; range, 1 to 52 days). The 49 PICC had 18 overall complications, for a rate of 29.8/1000 catheter-days. One central line-associated bloodstream infection (CLABSI) occurred (incidence rate, 1.62 cases per 1000 catheter-days). The most common reason for PICC removal was occlusion (38.9%) and local infiltration (33.3%).

**Conclusion & Discussion:** Our data suggest that the insertion of PICC were feasible in critically ill children with

cardiac disease. Our study reported similar complication rates to prior studies that have reported 17% to 50% rates. The occurrence of complications must be reduced and prevented through education and training of healthcare providers who insert and maintain catheters.

### PI13

#### Cardiac tamponed during insertion of a Hickman Catheter

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**Background:** Cardiac tamponade is a medical emergency that is associated with high mortality if not intervened immediately. Cardiac tamponade caused by perforation of the cardiac wall is rare and lethal complication related to Hickman catheter placement guided ultrasonography and fluoroscopy. We present a rare case of tension hemopericardium with cardigenic shock due to cardiac perforation in a patient with HC insertion who was successfully treated with transpericardial intervention.

**Case:** A 7-year-old female was placement of Hickman catheter. The right jugular vein was placed HC by fluruscscopy and USG with thalassemia was admitted to hospital due to bone marrow transplantation. HC placed right jugular vein guided ultrasonography and scopy. During the postoperative periodshe developed hypoxia hypotension and tashicardaia 8 hours after operation. The patient underwent an emergency median sternotomy and there was a small perforation right atrium and sutured. Following repair, the patient was diascharged at the 4. Postoperative day. Ultrasound revealed hemorrhagic cardiac tamponed.

**Conclusion:** This is a very rare but nearly always fatal complication. The prompt diagnosis and early intervention are important for successful outcome.

### PI14

#### Establishment and operation of peripherally inserted central catheters maintenance network in Zhong Shan

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**Introduction:** To provide local maintenance for Peripherally Inserted Central Catheters (PICC) patients and reduce the incidence of complications.

**Method:** Assembled the PICC maintenance expert panel in Zhong Shan, set up a maintenance network and provided training for local nurses and liaisons for PICC patients. Retrospectively analyzed the incidence of PICC associated complications, satisfaction of patients attended to PICC clinic using an evaluation scale and assessment of nurses in

PICC related nursing skills and knowledge by clinical operation exam and theory exam in 2010 and 2014.

**Results:** 210 cases before the network was built and 305 after that were included. Incidence of PICC associated complications decreased from 6.8% to 1.6% in 4 years. All the aspects including patients' satisfaction, traffic burden, service process and attitude towards patients were improved by the establishment and operation of the network, leading to a significant boost of overall patient experience scores (from 210 to 305,  $p < 0.001$ ). The average PICC associated clinical skills assessment score for healthcare providers raised from 78.8 to 89.7 and theory examination score raised from 83.5 to 96.7.

**Discussion & Conclusion:** The expert panel and maintenance network are beneficial to PICC patients and a booster for safe and spread usage of PICC in Zhong Shan.

**Keywords:** Local, PICC maintenance network, Quality of Care

### PI15

#### Best device for the patient

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**Introduction:** The uses of vascular access device (VAD) are associated with many complications, some which lead to early removal of the device. This can result in extended hospital stays which leads to increased costs and poor patient outcomes. It is important that we minimise discomfort and complications if we are to improve patient experience. After prolonged use of vascular access devices (VAD), veins become more challenging. This in turn makes vascular access more difficult over time. Many factors have to be considered before deciding which VAD to place, including the anticipated dwell time, patient's vasculature and the type of medication being administered. The type of VAD chosen must be made on an individual basis.

**Method:** NHSG (National Health Service Grampian) policy is to change short peripheral cannula every 72hrs. If someone required IV therapy for longer than 72hrs, rather than exposing them to repeated painful cannulations we decided to change to longer dwell catheters. Patients are assessed 24/48 hours following admission and the most appropriate device was placed. This was either a short cannula or a longer 8cm or 20cm catheter. This decision was dependent on the individual needs, the conditions of their veins and the treatment being administered.

During 2017 within the Out Patient Antimicrobial Therapy (OPAT) unit we inserted 30 leaderflex 8cm, 22g catheters which were left in for up to two weeks, and 60 leaderflex 20cm, 22g catheters which were left in for up to 6-10 weeks.

**Results:** During this time there were zero infections in the leaderflex catheters and only one device had a blockage.

**Discussion & Conclusion:** The use of these catheters is improving the patient's journey and has reduced the workload of staff members. Most importantly patients veins are being preserved and we are experiencing fewer episodes of missed medication doses along with improved patient outcomes.

## P116

### Occurrence of phlebitis in a private hospital in southern Brazil

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**Introduction:** Patients subjected to treatments requiring intravenous infusions receive a vascular, peripheral or central access. The patient is exposed to risks inherent in venous puncture, such as microbial growth, drug outpouring, reactions, obstructions of access and phlebitis, in the case of peripheral venous access.

**Objective:** To analyze the rate of phlebitis in adult patients in a hospital in southern Brazil in the year 2016.

**Method:** Quantitative research with the use of data extracted through the hospital notification system and the Infection Control service provides the phlebitis rate for hospital services, such as hospitalization, emergency, center of Adult intensive therapy, among others, for data analysis and action plan development relevant case.

**Results:** In 2016 were 71779 patients/day at the institution interned in internment units, with 85.95% of the patients in use of vascular access, of these 57.30% are of peripheral accesses, with a density of phlebitis of 6.29 of 1000 catheter/day. were Identified 178 chemical Phlebitis and we had dipyrone medication as the largest causing agent, we identified 81 mechanical phlebitis and 8 infectious phlebitis.

**Conclusion:** The biggest cause of phlebitis is related to the use of irritating and vesicantes medications. With this, we must monitor peripheral accesses with the same rigor that we carry out inspections in central venous accesses, systematically monitoring the patients who are punctured. Prevention measures should be installed, reinforced and monitored, hand hygiene, revision of the insertion of peripheral vascular accesses, as well as the administration of certain drugs. For so much was done institutional training with emphasis on the osmolarity and PH of the most used drugs in this hospital, also occurred the implementation of improvement in the medical prescription, where it is noted whether the prescribed drug is irritating or vesicant Guaranteeing safety and quality in this assistance process.

## P117

### Secondary lesions to curatives in central venous catheters: an observational intervention study

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**Introduction:** Treatments performed for patients in hematology therapy centres require central venous access for chemotherapy infusion, volêmicas and electrolyte repositions, nutritional support, blood components, and others. With this, patients are exposed to the adverse effects of therapies in which they are subjected and to the prolonged use of central catheters, presenting as a consequence: cutaneous fragility and skin lesions arising from the use of antiseptic solutions and Different types of coverings for bandages.

**Methodology:** It is a study of observational case, in patients of a hematologic unit of a hospital in southern Brazil that presented secondary skin lesions to the agents used in the maintenance of the central venous access curatives, from October 2016 to February 2017, describing the adequacy of aseptic technique adopted in the exchange of curative in patients with skin lesions in the vicinity of the venous device.

**Results:** Five patients were observed, for which the technique of exchange of the central venous catheter dressing was modified, performing: Sepsis of the insertion of the catheter and its adjacencies with chlorhexidine 0.5% and in the sequence performed the removal of this agent with serum Physiological 0.9%, remaining antiseptic solution only in insertion. After that, cover was applied with sterile transparent film. This procedure demonstrated the decrease of hyperemia in the area adjacent to the insertion of the catheter with better healing of areas with abrasive lesions.

**Conclusion:** Patients mentioned decreased burning symptoms, providing greater comfort, lowering pathways of infection and maintaining the adequacy of the correct techniques and safety in patient care. It is up to the nurse responsible for patient care to be aware of the agents causing these effects and the preservation of cutaneous integrity, minimizing the risk of infections arising from these lesions.

## P118

### Bloodstream infection related to the use of central peripheral insertion catheter

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**Introduction:** The central peripheral insertion catheter (PICC) is one of the choices for infusions of drug therapy

in adult, pediatric and neonatal patients, presenting a low rate of recurrent puncture complications as well as low rates of catheter-related infections, thus causing greater patient safety<sup>1</sup>. Studies indicate that the PICC has a decreased infection rate compared to the short-term central venous catheter, reaching 1.3%<sup>2</sup>.

**Objective:** To analyze the rate of infection of blood flow to the central peripheral insertion catheter in a private hospital in southern Brazil.

**Methods:** The search was performed through the indicators of the Infection Control Service of the hospital reported in the year 2016. The number of catheters inserted in 2016 was described, as well as the microorganism responsible for the infection of this catheter, as well as the final rate of infection.

**Results:** 197 PICCs were inserted in 2016 in adult patients admitted to the institution. We have resulted in a rate of bloodstream infection related to the use of this 0.5% catheter. We had a 6.6% infection in April (08 catheters were inserted this month) and 2.5% in July (18 catheters were inserted in this month). In the other months we did not have a PICC-related bloodstream infection. 76% of the inserted catheters were for antibiotic therapy use.

**Conclusion:** In the target hospital of this study we conclude that the PICC has low rates of bloodstream infection, being a safe option for the infusional therapy prescribed for the patient.

## P119

### Risk of midline catheter-related bloodstream infections in medical and surgical patients. A monocentric prospective study

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**Introduction:** Midline catheters (MC) are peripheral intra venous access devices placed in brachial or cephalic vein, which tip extends beyond the axillary line without reaching to the vena cava. They have a dwell time of up to 4 weeks. In our medico-surgical center, main indications are prolonged parenteral antibiotic treatments, parenteral nutrition and some chemotherapies. MC are inserted by a dedicated nurse team using ultra sound guidance. We observed a growing demand for this device up to over 300 catheters per year, in our 400-bed hospital, especially because of their ease of insertion and use. The safety of this device is reported to be good, but the literature is relatively scarce and often based on retrospective data.

**Objective:** The aim of this study is to determine the incidence of bloodstream infection (BSI) related to MC (MC-BSI). Our secondary objectives are to specify risk factors associated with MC related infections, to determine

the incidence of MC related venous thrombosis, and to evaluate patient comfort.

**Methods:** In this prospective single-centre cohort study, we will include consecutive patients eligible for a MC according to the physician in charge. Basically, over 18 years old patients undergoing more than 6 days of intra venous treatment are included. Demographic, insertion (e.g. vein depth, number of punctures...), clinical, biological and bacteriological data are prospectively collected. MC-BSI is defined as a combination of one or more positive peripheral blood cultures sampled immediately before or within 48 hours after catheter removal, a positive catheter-tip culture positive for the same microorganisms or a blood culture differential time-to-positivity of 2 hours or more, and no other infectious focus explaining the positive blood cultures. Inclusions started on the 15<sup>th</sup> of January 2018 and are ongoing for one year with an objective of 250 patients. ClinicalTrials.gov identifier (NCT number): NCT03373630

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## P120

### Picc and midline occlusions, nurses' knowledge: an observational study

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**Introduction:** The study evaluate nurses' knowledge about the best practices to prevent PICC and Midline occlusions, in order to set up corrective interventions.

**Method:** Nurses were divided in two groups, group A included nurses who attended the refresh training about vascular access on May 2017, while group B included nurses who didn't. We used a questionnaire created by a literature review.

**Results:** 37 occlusion on 377 PICC(9.81%), and 59 occlusions on 488 Midline(12.09%) occurred during the study period. Incidence of occlusions is similar among the units. Incidence of PICC occlusions(9.81%) is lower than the mean value obtained from other studies founded in the literature(11.32%).

Pre-occlusion time, the time between the devices placement and its occlusion, is 42 days for PICCs and 15 days for Midlines, respectively, in medicine units, 120 and 20 days in oncology units, 81 and 40 days in hematology units, and 16 and 13 days in surgery units.

43% of nurses from group A and 35% from group B gave the correct answer about the right timing of flushing. 33% from both groups disconnect IV infusion set and syringes without clamping the devices while using neutral needle-free connectors, as the producer of the device recommends. 29% from group A and 38% from group B knows that drugs interactions may increase occlusion risk.

**Discussion & Conclusions:** The number of correct answers (65% in group A and 62% in group B) and a p-value  $>0,05$  suggest that there isn't any difference in theoretical knowledge, but it's fundamental to correct the malpractices highlighted. Nurses specifically trained by the PICC Team, like the ones in oncology and hematology units, who can instruct and correct their coworkers guarantee a better management of PICCs and Midlines and longer pre-occlusion time. These specifically trained nurses appear to be a good solution to improve the management of the devices.

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## P121

### Report on pathways for adult clinical chemical medicines infusion with 1419 cases in several hospitals

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**Introduction:** Currently, there are many pathways options for clinical chemical medicines infusion. In order to observe results of chemical infusions using various types of pathways, this study accounting several hospitals using conditions hoping to provide reference for selecting pathways for clinical chemical medicines infusion.

**Method:** Conducting tracing observation on pathways of patients who first receive chemical medicines infusion with remaining needle, PICC, CVC pathways in hospitals and comparing the single use time of different pathways and complications.

**Results:** The single use time of remaining needle, PICC, CVC for chemical medicines infusion are  $1.64 \pm 0.87$  days,  $8.84 \pm 7.18$  days,  $4.44 \pm 2.02$  days respectively. The incidence rates of complication are 9.3% 41/441, 2.74% 6/219, 6.46% 49/759 respectively. The main complications of using remaining needle are phlebitis 70.8% 29/41, drug extravasation 14.6% 6/41 and catheter occlusion 14.6% 6/41. The main complications of using CVC are catheter occlusion 50.0% 3/6, blood and medicine ooze at point of puncture 33.3% 2/6 and catheter extrusion 16.7% 1/6. The complications of using PICC are blood ooze at point of puncture 42.9% (21/49), MARS 32.7% (16/49), phlebitis 10.2% (5/49), catheter joint break 6.1% (3/49).

**Conclusion:** Given the conditions that the single use time of different pathways for chemical medicines infusion conforms to regulatory requirements, they are differences in incidence rate of complication and of which remaining needle is the highest among three pathways. The main complications are thrombophlebitis, line blockage and blood ooze at point of puncture when using remaining needle, CVC and PICC. Clinical medical personnel should take different prevention measures when using different pathways for chemical medicines infusion.

## P122

### Effect of the implementation of the good practices in the care of central catheters

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**Introduction:** The study IBEAS realized in 2007 showed that the place where more adverse events took place was in the intensive care units.

The care of the patient in critical condition needs the laying of a central venous catheter, fundamental for its treatment, which can turn into a risk factor for the presence of the adverse event infection of blood stream.

The present study realized in June, 2017 took as a target to evaluate the effect of the good practices in the care of the central catheters and its contribution to the ITS-CVC decrease.

**Method:** Study of intervention, pilot of cross section, evaluated the incidence of ITS-CVC, the time and number of procedures of care of the CVC as well as the associate cost. 26 catheters were studied in 20 patients in June, 2017.

**Results:** There was updated and reduced the guide of care of CVC from 23 to 14 steps updating the practices based on evidence.

The average of permanence of the CVC was 9.38 days during which 1.57 healings were realized

They went over to 244 days without infection in the patients of the study.

**Discussion:** The project of implementation of good practices went to implement the good practices in the CVC care and contribute to the ITS-CVC decrease.

Similar to the study realized by Nakachi and Alvarado in pediatric intensive cares the decrease of ITS-CVC .

**Conclusions:** The implementation of the new guide of care of the CVC reached to 244 days without infection; there was diminished the time used in the process of healing in 17'equivalente to 68 % of the used time.

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### PI23

#### Anatomical analysis of residuals after central venous catheter extubation in 328 cases

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**Introduction:** Central venous catheters have become more and more widely used in clinical practice. However, few people have studied the residuals after extubation and thought about the implementation of effective catheter flushing & sealing and prevention of complications in the opposite direction. The aim of this study was to observe the extubation remnants and to analyze the relevant factors.

**Method:** 328 cases of central venous catheters pulled out after the staged treatment of tumor patients were dissected in time.

**Residuals:** within the heparin cap and lumen after catheter removal, and fibrin sheath formations on the surface of the catheters were observed with naked eyes. Results In 328 cases, 29 cases (8.84%) were found with residual drugs in heparin cap, 40 cases (12.20%) with remaining blood or blood clot in heparin cap, and 5 cases (1.52%) with residual drug in lumen; and all the residuals could be rinsed thoroughly with 10ml of saline. There were 57 cases (17.38%) found with fibrin sheath on the surface of the catheters, including 52 cases (21.76%) with fibrin sheath on polyurethane catheter and 5 cases (5.62%) with fibrin sheath on silicone catheter; the difference was statistically significant ( $P < 0.05$ ).

**Conclusion:** Routine maintaining of the catheters is quite important to ensure the effective use of central venous catheters. It is suggested that the standard procedures for catheter maintenance should be improved and the visual indicators should be used to evaluate the implementation of effective catheter flushing & sealing and prevention of complications to reduce the incidence of catheter residues.

### PI24

#### Chlorhexidine-containing dressings in the prevention of central venous catheter related blood-stream infections: a cost and resource utilization analysis

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**Introduction:** Central venous catheter related blood-stream infections (CRBSI) are one of the leading complications of neutropenic patients with hematological conditions. A recent study reported a reduction in probable and definite CRBSI in these high-risk patients using central venous catheter (CVC) dressings with a chlorhexidine-containing gel pad.

**Method:** Based on published real-life data, a health-economic analysis was performed to analyze the economic impact of using CVC dressings with a chlorhexidine-containing gel pad compared to non-chlorhexidine control dressings. A micro-costing approach of patients treated at the University Hospital of Cologne was used to determine CRBSI related direct treatment cost factors, such as antibiotic drug costs, treatment on hospital wards, and material costs for CVC.

**Results:** Between 02/2012–09/2014, 356 patients (178 patients in the chlorhexidine group and 178 controls) were included into our analysis. Distribution of probable and definite CRBSI in the chlorhexidine group and control group were 12 (7%) vs. 18 (10%) and 9 (5%) vs. 21 (12%), respectively ( $P = 0.011$ ). Median overall length of stay (25 days vs. 27.5 days;  $P = 0.633$ ) as well as days on treatment with antibacterials (10 days vs. 12 days;  $P = 0.142$ ) were similar between the chlorhexidine and control group. The most important cost drivers in both groups were treatment on general ward (€4,275, IQR: €592 – €6,504, vs. €4,560, IQR: €1,227 - €8,567;  $P = 0.122$ ) and laboratory tests (€4,777, IQR: €3,473 - €5,833, vs. €4,413, IQR: €2,966 - €5,959;  $P = 0.565$ ), resulting in median overall direct treatment costs of €13,881 (IQR: €10,922 - €25,457) vs. €13,929 (IQR: €11,295 - €23,561;  $P = 0.636$ ).

**Discussion & Conclusion:** Our study shows similar results in overall direct treatment costs, meaning that higher acquisition costs of chlorhexidine-containing dressings did not translate into higher overall treatment costs. Expenses were primarily outweighed by a lower rate of probable/definite CRBSI and reduced associated costs.

### PI25

#### Putting the patient first: re-examing an established vascular access platform to meet current needs

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**Introduction:** Implementation of a vascular access care bundle alongside hospital-wide routine surveillance is key to lowering rates of catheter associated infections, thereby improving patient safety and outcomes.

**Method:** The Trust has a systematic approach to reducing the rates of catheter associated blood stream infections (CLABSI) which include i) evidenced based guidelines ii) central line insertion packs for maximal sterile barrier precautions, iii) aseptic non touch technique competency assessments iv) standardising product around vascular access and infusion therapy across the complex multi-sited organisation v) increasing education, vi) incorporating a multidisciplinary surveillance team, vii) adapting CDC guidelines, viii) entrenching surveillance into routine clinical duties.

Surveillance data from 2008-09 to current 2017-18 was collated, alongside case reports, for MRSA, MSSA, ICU CLABSI and contaminant rates. Using this same approach we now have surveillance data on gram negative blood stream infections to inform our reduction plan.

**Discussion:** With increasing resources for epidemiology the trust was able to develop and evolve surveillance around CLABSI outside of the mandatory reported infections and into different specialities across the organisation. A multidisciplinary approach to reviewing suspected CLABSI enabled clinical teams to making improvements in care when deficiencies were identified during this process. The standardisation of product equipment related to vascular access and infusion therapy ensures the trust had evidence based product and procedures striving for excellence in this field and improving the patient experience.

We have seen substantial decreases in the proportion of MRSA and MSSA Trust associated bacteraemia which are catheter-associated, from 63% of MRSA BSI cases in 2012-13 being associated associated to 0% in 2016-17 and 31% of MSSA BSI cases line associated in 2014-15 to 23% in 2016-17.

**Conclusion:** Through the implementation of a care bundle approach, alongside Trust wide surveillance, we have seen a reduction in catheter associated bloodstream infections

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## PI26

### Venous access in neonates with congenital heart disease

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**Introduction:** PICC catheters are established venous access in children and adults. However; upper extremity veins have small diameter in neonates and therefore, insertion of PICC catheters may be associated with higher risk for thrombosis (1,2).

Neonates with congenital heart disease are a specific patient population in which the venous system thrombosis and its sequelae significantly contribute to morbidity and mortality. Prevalence and severity of thrombosis is associated with unique factors such as developmental and acquired bleeding disorders, complex perioperative care including the need of central venous access for monitoring, medical therapy, and catheterization procedures (2).

**Material and Methods:** The aim of this study was to evaluate the first experiences with the centrally inserted PICCs in neonates at Pediatric Cardiac Centre, Bratislava since the implementation of the PICC concept in. Data collection was performed prospectively in neonates with cardiac diseases who have undergone the PICC placement procedure. Continuous data are presented as median and range, nominal data is presented as percentages.

**Results:** During the period of 2 years, PICCs were inserted in 37 neonates with median weight of 2.9 kg (1.4-4.2 kg). The main indications were complex intensive therapy (70%), parenteral nutrition (14%) and Prostaglandin E1 therapy in 70%, 14% and 16% of patients, respectively. Double lumen 2.6 FR Medcomp® Vascu-PICC® catheter was introduced under ultrasound guidance through femoral or axillary vein in 35 (95%) and 2 (5%) patients, respectively. The vein diameter was 3 mm (2.5-3.9 mm). The duration of PICC use was 34 days (12-200 days). The complication rate was 8% comprising blood stream infection in 2 patients and 1 catheter tip thrombus.

**Conclusion:** Our first experience demonstrated that the use of PICC in neonates with heart diseases in the intensive care settings is a possible solution for central venous access.

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**P127****The implementation of a surveillance program to prevent catheter-related bloodstream infections in Intensive Care Units (ICUs)**

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**Introduction:** Catheter related bloodstream infections (CRBSI) are one of the most severe complications of central venous catheterization (CVC). Multimodal strategies, including educational programs, implementation of preventive measures and continuous surveillance of CRBSI have demonstrated great effectiveness. We aim to determine the efficacy of a CRBSI prevention program implemented in our ICUs.

**Methods:** Setting: 34 ICU-beds in a tertiary university hospital, Barcelona area, Spain. Study period: 2012-2017. The preventive program was implemented in mid-2014 and included: a) training of preventive measures among ICU healthcare workers, b) central line insertion checklist, b) maintenance: catheter care following CDC guidelines, **Surveillance:** daily monitoring of CVC condition by a member of the infection control team (ICT) and d) prospective surveillance of episodes of CRBSIs through daily meetings with members of the microbiology department. All episodes of CRBSIs were reported to the ICU team by an ICT member. Main outcome was CRBSI according to CDC definition. Rates of CRBSI were compared between pre-intervention period (PIP: 2012-2014) and intervention period (IP: 2015-2017).

**Results:** During the study period 150 episodes of CRBSI were diagnosed; among them 92 during the PIP and 58 during the IP. Demographic and clinical characteristics of patients between both periods were similar. Mean age 63 years (SD +/-13), 68% males. More frequent aetiology was coagulase negative staphylococci (32 episodes, 22.8%), *Klebsiella pneumoniae* (24,17%) and *Pseudomonas aeruginosa* (23,16.4%). Overall, CRBSI rates significantly decreased from 2.92 episodes/1,000 catheter-days in PIP to 1.60 in IP ( $p<0.001$ ). However, rates of peripherally inserted central venous catheter (PICVC) did not vary significantly along the study period (0.47 vs 0.46 episodes/1,000 catheter-days respectively).

**Conclusion:** the intervention program was effective in decreasing the rate of CVC-BSI in ICU, although this reduction was not observed among PICVC. Better strategies to prevent PICV-BSI are needed.

**P128****Reducing Human factors in IV care by using passive disinfection caps**

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**Introduction:** If decontamination of a vascular access port is not performed correctly there is a risk of microbiological contamination when it is accessed. The most widely adopted process performed of decontamination of hub is by use of an alcohol and CHG wipe. However, to ensure adequate disinfection is achieved this must be done in the correct manner, for a minimum of 15 seconds and allowed to dry for a further 30 seconds (Loveday et al, 2014). This is a multi-step approach and is open to human variation in the way that each clinician disinfects the device.

**Method:** To gauge the incidence for phlebitis rates caused by VADs within the SWFT Trust, in depth prevalence audits and Datix incident reporting for suspected infections were introduced in 2015. This was further accompanied by a Trust wide IV audit in 2016, in a form of a questionnaire to staff around port cleaning.

**Results:** The audit results demonstrated that there is a wide variation in cleaning practice across the departments. The knowledge base of staff was also inconsistent. 59% of IV hubs were being cleaned for 10 seconds or less and 64% of IV hubs were being accessed within 25 seconds or less.

**Discussion and Conclusion:** To reduce infection risk and human factor variation in practice the proposal was to introduce 3M™ Curoc™ disinfecting port protectors, which would be applied to the port of every needleless connector/VAD used within the Trust.

Since the introduction of Curoc caps for passive disinfection in June 2017, there is now one disinfection method for all access of IV lines.

(NB; Compliance levels, the reduction in datix relating to VADs and time saving results will be further tracked and discussed after the first quarter of 2018).

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**P129****Non-infectious complications of central venous catheters as a nursing care indicator at an brazilian pediatric oncology hospital**

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**Introduction:** Use of Central Venous Catheters (CVC) is essential in children when treating malignant diseases. The maintenance of catheter reflects the quality of nursing care. Catheter obstruction or accidental dislodgement due to traction are non-infectious complications and can be

considered as a quality indicator in an oncologic pediatric hospital setting. Our purpose was analyze those complications related to CVC removal in a hospitalized pediatric oncology patients from a developing country hospital.

**Methods:** A prospective analysis using the reporting system (SAS Interact®) from a pediatric oncology hospital at a developing country database between February 2016 to August 2016. We analyzed demographic features, rate of CVC removal due to non-infectious complications (accidental dislodgment or catheter obstruction) and the number of patients with CVC per day, multiplied by 100.

**Results:** Hundred-fourteen CVC were inserted into 110 children during the 6-month period. From 110 catheters removed, thirteen were due to non-infectious reasons, nine related to accidental dislodgment, four to obstruction. Average catheter life was 12.8 days, with a total of 911 catheter days. Regarding CVC events, the pediatric ward had an average of 143 CVC insertions per month, and an incidence of CVC removal of 0.85 per 100 catheter-days. At Bone Marrow Transplant Unit had an average of 59 CVC patients per month, and removal incidence of 1.07 per 100 catheter days. The Pediatric Intensive Care Unit had an average of 118 CVC patients per month, what represented 60% of it occupation, and removal incidence of 0.11 per 100 catheter days. Overall hospital CVC removal incidence was 0.41 per 100 catheter days.

**Conclusions:** Non-infectious CVC removal can be used as an indicator of nursing care at pediatric oncology hospitals and give an assertiveness related of improvements, to decrease this rate improving children nursing care.

### P130

#### Clinical effectiveness of 4% tetrasodium EDTA as a routine non-antibiotic antimicrobial lock solution in central venous access devices of hemodialysis and TPN patients against the TripleThreat™: An 18-month Canadian experience

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**Introduction:** The ideal catheter lock solution should be able to prevent the occurrence of the TripleThreat™ of clot, bacterial colonisation and biofilm formation. Providing an effective barrier for the inside of central venous access devices (CVADs) must be part of the multimodal approach to decrease the risk of catheter related complications such as catheter related bloodstream infections (CRBSI) and occlusions. However, this lock solution should not contribute to increasing the risk of antimicrobial resistance (AMR) and/or bleeding episodes. The *in vitro* effectiveness of a novel non-antibiotic antimicrobial solution of 4% tetrasodium EDTA was confirmed against biofilms formed by

clinically relevant bacteria and fungi. The anticoagulant property of EDTA is well known and trusted. Therefore, the objective was to collect post approval safety and efficacy data from the use of this catheter lock solution in Canadian patients compared to the standard of care.

**Methods:** Hemodialysis and TPN patients with CVADs were selected across Canada according to their high risk of CRBSI and alteplase use.

**Results:** Canadian data collected over the last 18 months show both a clinically relevant decrease in CRBSI and alteplase use when the standard lock solution was replaced by 4% tetrasodium EDTA. The most frequent use of this lock solution was once a day in TPN patients with no safety concerns. Hypocalcemia was not observed with its use over time.

**Discussion and Conclusion:** Results highlight the ability of 4% tetrasodium EDTA to reduce bacterial burden and biofilms in CVADs as well as providing well-established anticoagulant activities. Its multiple modes of action should prevent resistance from arising, protecting against catheter colonization and subsequent CRBSI, in patients with CVADs independent of medical condition. Tetrasodium EDTA is a safe and effective non-antibiotic antimicrobial lock solution in a time when the threat of AMR “superbugs” is real and increasing.

### P131

#### Central venous catheter occlusion and infection risk - the impact of needleless connector design

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**Introduction:** Central venous catheterization (CVC) is commonly used in critically ill patients, and may cause different complications, including infection and occlusion. Although there are numerous studies surrounding CVC-related infections, very few have examined the matter in greater detail. The objective of this study was to analyze the incidence of central venous catheter intraluminal catheter blood occlusion (CVC-IBO), as related to the use of differently designed needleless connectors (NCs), further correlating the incidence of central line associated bloodstream infections (CLABSIs) to the incidence of CVC-IBOs.

**Method:** A multicenter retrospective time series study was conducted to compare CVC-IBO rates with NC use, in conjunction with associated CLABSIs, at sixteen separate hospital facilities. Participating facilities were alike in their desire to reduce CRBSI and CVC-IBO rates, and the interventions which were introduced, but varied in facility type, size, patient population, and geographic location. CLABSI rates were tracked by all facilities as defined by the National Healthcare Safety Network (NHSN). Further

correlations were analyzed in the facilities reporting increased CVC-IBO and CLABSI rates, including fluid displacement properties of the NCs utilized at the referenced facilities.

**Results:** The study included 28,765 central line days (CLD). The mean CLABSI rate of the 16 studied hospital facilities was 2.32 per 1000 CLD. The CVC-IBO rate was 2.89, with a tPA utilization rate of 97 doses per 1000 CLD. 7 of the 16 facilities utilized Negative Displacement NCs, while 9 facilities utilized Positive Displacement NCs. The overall incidence of CLABSI was statistically higher for facilities utilizing Negative Displacement NCs, along with a correlation between CVC-IBOs having a direct influence on CLABSI causation.

**Discussion & Conclusion:** NCs with negative fluid displacement had the highest rate of CVC-IBOs, along with a correlated increase in CLABSI rates. Furthermore, these facilities also incurred amplified costs due to increased tPA and antibiotic utilization.

### P132

#### Central catheter indicators in pediatrics: evidence for the care improvement in a Brazilian pediatric hospital

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**Introduction:** Nursing care given to patients using central venous access competes with practices related to patient safety. The use of central venous catheters in a Brazilian pediatric hospital, certified by the Joint Commission International, generated successful results during 2017 year. The objective of this study is to report the results obtained by the management of central venous catheters indicators in a pediatric non intensive care unit.

**Method:** quantitative, retrospective and descriptive study. A survey was performed on quality indicators for central venous catheters in pediatrics, so that the quantitative variables: catheter loss and infection density related to central catheter were evaluated monthly between January and December 2017, in 80 beds of the institution.

**Results:** There were 5.738 admissions of pediatric patients in the analysis period, with an average occupancy rate of 86%. The patient/day number in pediatric non intensive care unit was 23.038 and the patient/day number with a central catheter was 3.531. The variable rate of catheter loss notification was 0.19% (n = 7) and the variable density of infection related to central catheter was 0.11% (n = 4).

**Conclusion:** the quality of the care given to the central catheters management to the pediatric patient is reflected by the low rates of complications monitored by the care indicators. The pediatric non intensive care unit reflects the concern to put the patient in the forefront by competing with evidence-based best practices. The use of advanced techniques of central catheter passage (exclusively

surgical center) with the implantation of a catheter passing team in 2017 has contributed to reach the pediatric nursing excellence assistance performed at the institution.

### P133

#### Catheter-related bloodstream infections (CRBSI): when one factor alters the product

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**Introduction:** Our institution is a nonprofit healthcare organization specialized in adults with acute pathologies. With a total of 70 beds, 16 are at polyvalent ICU.

Ours being as neurointensivist institution, femoral insertion is the most frequently used site for central venous catheters (CVC)

**Objective:** to describe our experience o the impact of active surveillance in identifyin the drivers of an increase in CRBSI

**Methods:** prospective descriptive and comparative analysis of patients hospitalized at the ICU requering CVC since July 2012 till July 2017

**Results:** A total of 23.262 days/patient, 10.633 days/CVC were included in the study period. Catheter duration ranged between 2 and 32 days, mean 10 days. CRBSI rate in the period Jul12-Jun14 was 1 ‰, the last episode occurred in Feb14. On Jun14 two CRBSI were registered, followed by three other episodes in July. The only change observed in the period was the shift from flexible plastic packed parenteral solutions to those packed in rigid plastic. When informed about these findings, the Committee recommended to purchase flexible plastic as soon as available. As from product availability, no further episodes were registered. Since Dic14, 6 episodes occurred, the cumulative CRBSI rate is 1,6‰ due to the small numbers of days/catheter. Only one of the CRBSI occurred at a femoral insertion; most CRBSIs were yugular.

**Conclusion:** Active surveillance and an effective program are key to timely detect and modify the factors leading to an increase in CRBSI. Although our institution does not follow the guidelines regarding site of catheter insertion, we have been able to sow rate 0. Even not being an objective of this study, for us femoral insertion is a safe alternative for CVCs, when following appropriate aseptic measures at insertion and adequate nursing care.

### P134

#### Venous thrombotic events associated with implanted vascular access devices in oncology patients: a prospective cohort study

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**Background:** Implanted vascular access devices (IVADs) have significantly improved the management of oncology patients. These patients are at an increased risk of venous thrombosis (VT) and IVADs are a known risk factor. In our previous retrospective cohort 4.5% of patients developed a catheter related VT (CRVT). This prospective, single cancer centre study sought to determine the incidence of CRVT when BioFlo® IVADs (Angiodynamics, Inc), composed of a thrombus resistant material, were inserted.

**Methods:** Between 08/2015 and 09/2016, 400 oncology patients aged 18-85 years with a life expectancy >3 months were enrolled. Patients with previous central VT, systemic anti-coagulation, and coagulopathies were excluded. The primary outcome was the incidence of CRVT as confirmed by ultrasound or venography. CRVT was defined as symptomatic upper extremity VT (axillary vein or proximal, including superior vena cava (SVC)). Demographic and clinical characteristics were captured. Patients were followed for 12 months or until catheter removal, including death, through electronic medical records review and contacted quarterly to determine if the IVAD was being used, to confirm current medications and to solicit information on IVAD complications, function and patient satisfaction.

**Results:** The median age of the cohort was 58.2 years; 68% (n=273) were females. Sixty-six percent had gastrointestinal cancer (including pancreatic cancer) and 68% had metastases. Eighty four percent of IVADs were placed on the right sided. Ninety nine percent of catheter tip placements were distal SVC (n=237), cavo-atrial junction (n=67) or atrium (n=90). Five patients had symptomatic VT (1.25%). Two patients had a diagnosis of colorectal cancer, 2 breast cancer and 1 pancreatic cancer.

**Conclusion:** In this prospective study, symptomatic IVAD associated CRVT was an infrequent complication in patients at high risk for VT.

### P135

#### The influence of peripheral intravenous catheterization on the sleep quality of patients

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**Introduction:** This observational study aimed to examine the relationship between peripheral intravenous catheter (PIV) placement and sleep quality, such as sleep parameters and subjective sleep quality.

**Method:** Participants were inpatients of an ophthalmic ward of a university hospital in Tokyo, Japan. Some participants (i.e., the catheterization group) were administered

a PIV with heparin lock (100 U/ml) in preparation for a surgical procedure on the following day. Throughout the night, we investigated the sleep state of both catheterized and non-catheterized patients. Sleep parameters were observed by 'Nemuri SCAN' (PARAMOUNT BED CO., LTD. Tokyo, Japan) and a subjective sleep quality questionnaire, the Oguri-Shirakawa-Azumi sleep inventory MA version (OSA-MA), was used. This study was approved by the Research Ethics Committee of the Graduate School of Medicine at the University of Tokyo (#11670).

**Results:** The number of participants in the 'catheterization group' and 'non-catheterization group' were 53 and 55, respectively. There were no significant differences in sleep parameters or subjective sleep quality between the two groups. However, 19 of the 52 participants (36.5%) in the 'catheterization group' awoke during the night, worried about their inserted catheter. The most widely given reason was 'pain associated with movement' (63.2%). Furthermore, for the participants who experienced pain associated with movement, three of the five subjective sleep quality factors measured by OSA-MA were lower than those of the other participants. These three factors were 'initiation and maintenance of sleep' ( $p=.018$ ), 'feeling refreshed' ( $p=.006$ ), and 'sleep length' ( $p=.029$ ).

**Discussion & Conclusion:** This study found that PIV placement had influence on the subjective sleep quality of patients who experienced pain associated with movement, due to stimulus from the catheter, even though it was not related to sleep parameters. Continued development of the catheter and the catheter fixation method are required for reducing pain and improving sleep quality.

### P136

#### Audit of topical chlorhexidine dressing in haemodialysis patients

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**Introduction:** Caring for patients on long-term haemodialysis has many challenges and these are increased when patients are care for on multiple sites using multiple agencies. One of the particular challenges faced by St George's University Hospital NHS Foundation Trust (U.K) is the prevention of catheter related bloodstream infection (CRBSI).

Since the publication of NICE (National Institute for Health and Care Excellence) medical technologies guidance in the UK in July 2015 (MTG25), there has been renewed interest in the usage of topical CHG and an evidence base on which to identify overall cost savings through the prevention of CRBSIs.

**Method:** A 2 week trial of the Johnson & Johnson Biopatch® and 3M™ Tegaderm™ CHG IV securement dressing was arranged and an evaluation form was devised by the Renal Practice Educator (Fig. 2). 9 members of the dialysis nursing staff completed the evaluation forms for each product.

**Results:** There was a clear preference for the 3M™ Tegaderm™ CHG IV securement dressing with an overall lower score (1 – 5 = good to poor) given on each of the 9 evaluations. There were 2 individual preferences for the Johnson & Johnson Biopatch® both related to patient body image and 19/72 individual category scores that were equal for both products.

**Discussion:** The audit showed a clear preference for the 3M™ Tegaderm™ CHG IV securement dressing.

**Conclusion and future plans:** This represents the first stage of a project to reduce the number of CRBSIs within the renal dialysis population at St George's Hospital. The new dressing will be introduced alongside training and education in the care and management of central venous access devices. Re-audit will be performed to assess the impact of the new dressing and training.

### P137

#### Unintended complications associated with the use of traditional gravity-flow infusion administration sets (gravity sets) - systematic review

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**Background:** Traditional gravity-flow intravenous infusion sets are widely used in several countries worldwide, however, they are associated with several complications that add to clinical, economic and institutional burden. Our objective was to highlight some of the complications associated with the use of traditional gravity sets and understand how advanced technologies can help reduce these risks.

**Methodology:** We conducted a literature review in July 2017, using PubMed, Embase, UpToDate, Scopus, and Google scholar online databases, and conference posters, to retrieve relevant studies. Studies reporting complications such as air in-line, air embolism, contact contamination, blood reflux, phlebitis, and impact on nursing workflow associated with using the traditional gravity-flow intravenous infusion sets were included and analyzed.

**Results:** We identified nearly 100 studies in different patient groups globally. Notifiable causes of air embolism were air entry into gravity sets, air in-line when IV bag runs dry, IV line discontinuation, infusion flowing by gravity, improper flushing. Although the incidence of air embolism is generally low (about 0.13%), it was reported to be as high as 40% in neurosurgery or head/neck surgery

when patient is in the seated position. Symptoms such as agitation, confusion and acute respiratory distress syndrome in adults and cyanosis in neonates, can lead to additional hospital stay and mortality rate of up 30%. Contact contamination ranges between 2-11% in the US and was reported to be as high as 28% in Denmark with positive cultures from administration sets. Advanced gravity with auto prime helps to reduce the incidence of phlebitis by 25% further and, 35% in time and personnel input for both short and long-term infusions vs traditional gravity sets.

**Conclusion:** Adopting advanced gravity sets with auto prime and anti-run dry technology can help to prevent clinical complications, improve healthcare worker efficiencies and overall health outcomes compared to conventional gravity sets.

### P138

#### Comparing the burden of catheter-related bloodstream infection between manually-prepared saline flush and commercially available pre-filled syringes, used in combination with needleless connectors – meta-analysis

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**Objective:** CRBSI rates reported with prefilled saline syringes and manually prepared flush vary largely in the literature. The aim of this analysis was to compare the effectiveness of these two flushing techniques in reducing CRBSIs in clinical settings by comprehensively assessing the literature.

**Method:** Studies reporting CRBSI rate of commercially available prefilled syringe using BD PosiFlush™, conducted from 2010 - 2017 were included in the study. CRBSI events were reported as % patients and CRBSI per 1,000 catheter-days with calculated risk ratios (RR) of the comparator arms. Meta-analysis was performed using Review Manager (5.3) with a random effects model to estimate RR with 95% confidence interval (CI), and funnel plots were used to assess study heterogeneity.

**Results:** A total of 27 studies were identified through literature review, of which 5 met the inclusion criteria for meta-analysis. All included studies involved flushing centrally placed catheters. Overall, the risk of developing CRBSI with PosiFlush™ was 57% lower than with manually prepared saline flush (RR= 0.43, 95% CI= 0.20-0.90, P=0.03) with significant study heterogeneity (P=0.0005). Adjusting for heterogeneity, 2 studies were removed. The remaining evaluated the combination of PosiFlush™ and a split-septum connector in adult ICUs, which demonstrated a 73% reduction in the risk of CRBSI (RR= 0.27, 95%CI= 0.17-0.44) with no evidence of heterogeneity (P=0.91). 2 of these studies reported CRBSI per 1,000 catheter-days,

and it was found that there was a 70% reduction in the rate of CRBSI (Rate Ratio= 0.30, 95%CI= 0.18-0.51, P<0.0001).

**Discussion:** The combination of prefilled BD PosiFlush™ and split-septum connector is associated with significantly lower rate and incidence of CRBSI compared to manually-prepared saline solution with other connector types among patients with CVADs. This in turn could have better economic and quality of life outcomes.

### P139

#### Reducing catheter occlusion: switching negative to positive displacement needle free connectors (nfc) to see the effect on peripherally inserted central catheter occlusion

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**Background:** Peripherally Inserted Central Catheters (PICCs) are now considered as an effective choice for intravascular access for patients who need long term IV therapy. This has caused an increase in the number of PICC lines inserted; however, as one of the potential problems associated with central lines is line blockage, the incidence of occlusion has also increased. This has prompted the Intravascular Team to search for ways to reduce the occlusion rate; accordingly there was an evaluation of different NFC wherein one of the criteria considered for trial were mechanical valves that produce positive fluid displacement when a syringe or giving set was disconnected from an IV device, as opposed to the previous connectors used in the Trust which were negative displacement valves.

**Purpose:** To reduce the occlusion rate of PICC lines by using positive displacement needle-free connectors.

**Method:** A trial was done by using a positive displacement injection connector over 6 a month period in one of the medical wards that previously used negative displacement connectors. The total number of PICC line occlusions was determined by the prescription and administration of Urokinase, a thrombolytic agent to unblock partial or total line occlusions. Previous retrospective data from the previous 12 months was used as a comparison.

**Result:** Out of 59 patients with PICC lines, there were only 7 line occlusions during the trial period that lasted for 206 days/ 29 weeks and 3 days. The dwell time ranges from 0-110 days.

**Discussion:** A year prior to the trial, the total number of line occlusions recorded was 37. These occlusions were linked up to the usage of Urokinase.

**Conclusion:** There was a significant reduction (66% decrease) in line occlusions as evidenced by the decrease of Urokinase prescribed which could be attributed to the change from a negative to positive displacement NFC.

### P140

#### Reducing peripherally inserted central catheter (PICC) related upper extremity deep vein thrombosis (UEDVT) and occlusions - a retrospective case controlled study

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**Introduction:** A retrospective analysis was carried out by the nurse led Vascular Access Service to investigate the incidence and associated costs of treating UEDVTs and Occlusions in PICCs. Two types of PICCs were compared over two time periods; a non-valved PICC and the pressure activated safety valved (PASV™) PICC made from a non-thrombogenic material.

**Methods:** Inclusion: Patients who received the non-valved PICCs between November 2013 and October 2014 and patients who received the valved PICCs between March 2016 and January 2017. A combination of single 4French and double lumen 5French PICCs were inserted to patients requiring various intravenous needs. Placement confirmed by chest X-ray. All insertions were atraumatic and with ultrasound guidance. The maintenance protocol of saline flush with push-pause technique and a positive-pressure needleless device was controlled across both groups. Data collected: reported occlusion incidence, PICC removals and re-insertions, anti-thrombolytic treatment, reported UEDVTs and pharmaceutical cost to treat, staff time/cost to treat occluded PICCs and additional intravenous access required to continue interrupted treatment.

**Results:** This audit showed an incidence rate of 26.22% occlusions (n=75) and 1.05% UEDVTs (n=3) in 286 non-valved PICCs. Whereas, in 566 valved PICCs there was an incidence rate of 2.65% occlusions (n=15) and 0.35% UEDVTs (n=2). The real life cost of the non-valved PICC complications was £26,025 (2012 tariff) whereas the cost for the valved PICC was £340.

**Conclusion and Discussion:** The valved PICC has shown an 89.89% reduction in occlusions, and a 66.66% reduction in UEDVTs. This study was limited to two particular brands of PICC and does not generalise all the non-valved or valved PICCs in the market. Further studies can be done comparing more brands.

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## PI41

### **Budget impact (BI) of adopting a Central line-associated bloodstream infection (CLABSI) prevention approach for ICU patients in UK, France and Germany, consisting of antimicrobial I.V. dressings and disinfecting caps**

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**Introduction:** CLABSI remains a common and serious complication in ICUs, despite progressive decrease with the implementation of care bundles. Clinical efficacy of accretive use of devices intended to further reduce the CLABSI rate was demonstrated in RCT and real-life studies. Extra costs incurred by the adoption of new technologies refrain prompt adoption. Health-Economics modelling and BI analysis are powerful tools to predict total direct costs and orient decision-makers to adopt the most economic and clinically impactful solutions.

**Method:** BI, from the perspective of ICUs, of replacing traditionally used flat films and conventional sterile caps by the 3M vascular access bundle, was calculated using a static decision tree model. Expected efficacy of 3M vascular access bundle is assumed as 97.3% CLABSI reduction, targeting both extraluminal and intraluminal routes of infections and 63.3% reduction of local site infection. The direct medical costs are based on cost of inpatient stay in ICU. Model data is based on published literature. Parametric uncertainty was evaluated with a one-way sensitivity analyses.

**Results:** In hypothetical ICUs consisting of 10 beds, the annual total savings were Eur 59,449 in the UK (75% cost decrease), Eur 91,303 in France (81% cost decrease), and Eur 81,776 in Germany (80% cost decrease) when 3M vascular access antimicrobial bundle is compared to current practice. The annual number of CLABSI and local site infections decreased from 4.9 and 76.9 to 0.1 and 28.2 in the UK, 7.6 and 76.9 to 0.2 and 28.2 in France and 4.3 and 76.9 to 0.1 and 28.2 in Germany. Rate of CLABSI, cost of CLABSI and intervention efficacy were the most influential parameters identified in the one-way sensitivity analysis.

**Discussion & Conclusion:** 3M vascular access antimicrobial bundle appears as a cost saving intervention and should be recommended for a routine use in ICU setting across West Europe

## PI42

### **The incidence and cumulative risk of primary bloodstream and venous infections in 12,623 peripheral intravenous catheters in Australia**

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**Introduction:** The aim of this study was to quantify risk of primary bloodstream and local infections associated with PIVCs, and to assess relationship to dwell time.

**Method:** We synthesized data from multiple prospective research studies in Australia (10 studies; 11,487 PIVs) with rigorous prospective collection of dwell times, primary BSIs and venous infections using NHSN 2017 criteria. PIVCs were inserted in a range of clinical departments and by various inserters; ultrasound was not used, and IV insertion teams were rare. Post-insertion care was by bedside nursing staff using routine hospital policies. The primary outcome was primary bloodstream infection (BSI, i.e. no other known source for the infection so the PIVC is a possible source). Secondary outcomes were Bloodstream Infection-Laboratory Confirmed BSI (BSI-LCBI, i.e. evidence that the PIVC is the likely source), and cardiovascular system-vascular (CVS-VASC) (local PIVC) infections. NHSN 2017 definitions were used for all outcomes. Infections were blind-adjudicated. Dwell times were calculated from insertion and removal times.

**Results:** Primary BSIs occurred in 6/11,487 (0.05%) PIVCs or 0.15 per 1000 PIV days. Of these, 3/11487 (0.026%; 0.075 per 1000 PIVC days) were BSI-LCBIs. In addition, there were 3/11487 (0.026%) CVS-VASC local infections. PIVCs were in place for <1 to >19 days and the primary BSIs occurred from Day 2 to Day 7, with no trend detected over time.

**Discussion and Conclusion:** While infections can occur, and ongoing vigilance is required to prevent them, this prospective, rigorous follow up of PIVCs identified a low rate of primary BSI and local infections under typical Australian hospital conditions. We did not observe an increase in BSI risk with dwell time.

## PI43

### **Defining difficult peripheral venous access in hospitalized patients. A cross-sectional study**

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**Introduction:** This study aims to estimate the incidence of difficult peripheral venous access (DPVA) in a general population of hospitalized patients from different settings. We also aim to describe differences between DPVA and “not difficult” venous cannulation regarding first attempt success, number of punctures, time to cannulation and number of clinicians involved.

**Method:** Cross-sectional study in 8 public hospitals. Data was collected from June to December 2016. We included adults in need of peripheral venous cannulation for therapy infusion during hospitalization in critical care, emergency department (ED), operating area and hospital wards. Women during labour and patents receiving reanimation were excluded. Variables were reported by registered nurses after obtaining informed consent. Criteria for DPVA were: 2 or more failed attempts of cannulation or need of ultrasound assistance due to cannulation failure or inability to obtain peripheral access.

A descriptive analysis of variables with IBM SPSS 18.0 was performed, including association tests comparing groups with and without DPVA.

**Results:** 974 patients were included; average age was 64.2±17.66 years. Women were 53.8% of the sample, statistically more present in the case group (52.4% vs 64.8% p=0,014). Incidence of DPVA was 11.09% (n=108).

First attempt success rate was 5.6% in DPVA group and 86.7% in control group (p>0.001). We found statistically significant differences in the average of punctures (1.13±0.34 vs 3±1.36 p<0.001) and time to cannulation (7.14±5.15 vs 22.74±15.89 minutes p<0.001). The need of a second clinician was more frequent in DPVA group (2.77% vs 46.3% p<0.001). Difficult-to-access veins were more likely to be inserted at the antecubital fossa rather than at the arm (12.1% vs 30.6%, p>0.001).

**Discussion & Conclusion:** DPVA is a common problem in daily practice that exposes patients to repeated punctures and requires an increased use of resources. This situation can drive to several undesirable effects.

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## PI44

### Clinical impact of needleless connectors' design: Systematic review

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**Introduction:** Needleless connectors (NCs) were introduced to eliminate the use of needles on intravascular catheters, and their newest generation were designed to improve patient safety and reduce central line-associated bloodstream infection (CLABSI) risks. The aim of this study was to review types of NCs and open systems and their effects on CLABSI rates and other outcomes.

**Method:** A systematic review (SR) was conducted through a research protocol consistent with the Preferred Reporting Items for SRs' recommendations. MEDLINE, Cochrane and other databases of SRs were searched for relevant studies published from January 2000 to September 2017.

**Results:** We identified 20 studies comparing CLABSI (according to CDC/NHSN definition), contamination, displacement, kinking/loosening, occlusions and phlebitis associated with NCs with positive displacement device (PDD), negative displacement device (NDD), or neutral displacement device (NEDD), or three-way stop cock (3WSC). Fourteen studies reported CLABSI rates (2 did not attain statistical significance). CLABSI rates were lower using PDD vs. NDDs/NEDD (3 studies), higher when using NDDs vs. NEDD (1 study), and lower using NDDs vs. 3WSC (3 studies), except for Smart site (1 study). CLABSI rates varied when using different types of PDD (2 studies) and NDD (4 studies) were compared. Internal microbial contamination percentages were higher using 3WSC vs. NDD (2 studies) and vs. PDD (1 study), and when PDDs were used instead of NDDs (1 study), but varied with different types of NDD. Using 3WSC vs. NDD (Split Septum) showed higher percentages of bending/kinking (0 vs. 5.5), blockage (2.1 vs. 4.6), displacements/loosening (0 vs. 5.5), extravasations (9.1 vs. 24.8), and occlusions (3.7 vs. 11.9) but the same percentages were reported for phlebitis (2.8) (2 studies).

**Discussion and Conclusion:** CLABSI rates and most adverse outcomes analyzed were statistically higher when 3WSC (open device) was compared to PDD, NDDs and NEDD, but varied among closed device designs.

## PI45

### A quality improvement management project to improve the management of ambulance inserted peripheral cannulae (PIVC)

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**Introduction:** Both the Sunshine Coast Hospital and Health Service (SCHHS) and Queensland Health Guidelines require Catheters inserted in emergency situations, when adherence to asepsis cannot be ensured, should be replaced by a clinician within 24 hours or sooner if the patient's condition is stabilised. However despite the availability of the aforementioned guidelines, current audits performed by the SCHHS Vascular Access Surveillance and Education (VASE) team have shown that 73.7% of all ambulance inserted PIVC have a dwell time of greater than 24 hours despite our local procedure. The ability of health care workers to recognise ambulance inserted PIVC to facilitate timely removal was noted to be an issue hindering the timely removal of ambulance inserted PIVC.

There are close to 200 000 healthcare associated infections (HAIs) in Australian acute facilities each year. Intravenous (IV) catheters cause over 3,500 cases of blood stream infections (BSIs) every year in Australia. BSI infections are associated with mortality of over 10% and in many cases also significant morbidity. These events are potentially preventable through correct IVD management.

**Methods:** Pre implementation data collected was date of audit and date of insertion, which professional stream inserted the PIVC, site assessment, documentation and dressing adequacy. Implementation of the quality improvement project was stakeholder engagement, development and rollout of PIVC sticker to identify ambulance inserted PIVC and staff education. Post implementation data collection included the same audit tool as in pre implementation audit.

**Results and Conclusion:** The conclusion of the project was sticker identification prompted early removal of the PIVC within the recommended 24 hour timeframe from 26 % pre to 71%.post. The number of QAS cannulas present was reduced. The SCHHS will be continuing with the sticker initiative.

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## PI46

### Quality and safety in Picc lines using the failure mode and effect analysis method: A pilot program

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**Introduction:** Inserting an intravenous device is the most common procedure in hospitals but these devices are also the cause of many complications.

One type of long-term device is a peripherally inserted central catheter (PICC). Picc use has grown significantly in recent years but sometimes it has adverse effects. The occurring failures can have impacts of different severity with respect to economic, health and safety impacts.

Failure modes and effects analysis (FMEA) is a method of investigation to determine how a process might fail and the likely effects of particular modes of failure.

Our objective is to motivate the use of this tool in the PICC insertion protocol to identify and quantify the risk in order to avoid or mitigate them.

**Methods:** This is a multicentre study pilot with the collaboration of 9 Spanish hospitals using a method of prospective risk analysis.

The study has a several phases: to understand the needs, to develop and evaluate the process, to create an effective FMEA Team and to define the FMEA scope.

The factors considered are the frequency of occurrence, severity, detectability of an item failure mode, and scoring the risk priority number.

**Results:** So far, we don't have results because we started the project in January 2018 and this tool is something new in vascular access.

**Conclusions:** FMEA is known in the field of process failure analysis and used in manufacturing areas, process and products development.

The two major challenges in completing an FMEA are to be confident that all possible significant failure modes have been identified and the description of the failure mode must be completely clear and that different sources that result in the same failure should be differentiated.

Limitations: the multidisciplinary expert group involved in the process and the need of a facilitator - leading person with FMEA expertise.

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## P147

### The impact of pre-filled saline flush syringes in reducing the incidence of peripheral venous catheter failure. A quasi-experimental multicenter study

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**Background:** The unscheduled replacement of peripheral venous catheter (PVC) is common and frequently entails a new invasive procedure. Flushing the catheter before and after use maintains patency and prolongs catheter dwell time. Although saline flushing is highly recommended, compliance in the daily routine care is uncertain.

**Objective:** To determine whether there are significant differences in overall PVC failure rates before and after introduction of pre-filled flushing syringes and to assess risk factors for PVC failure.

**Methods:** quasi-experimental design; before-and-after intervention study. Intervention: Introduction of pre-filled saline syringes for flushing. Multicenter study conducted in medical and surgical units in 3 European hospitals for a period of 9 months (5 months pre-intervention, 4 months intervention). Main outcome: Catheter failure, defined as a composite variable encompassing unscheduled withdrawal or replacement of PVC because of any of the following conditions: phlebitis, thrombosis, infiltration/extravasation, and suspected infection. A multivariate Cox proportional hazard ratio was used to identify factors associated with the occurrence of PVC failure.

**Results:** Data were analysed for 3,853 PVCs in 1,915 patients. Overall, the incidence of PVC failure was 50.1%, mainly due to phlebitis and infiltration/extravasation. Compared to pre-intervention period, a significant decrease in PVC failure rate was observed in the intervention period (55.4% vs 44.8%,  $p < 0.01$ ). Risk factors for PVC failure were: Charlson score  $\geq 4$  (HR:1.64;95%CI:1.069-2.527), days of hospital stay  $\geq 10$  (HR:1.46;95%CI:1.172-1.837),

and the use of PVC "A" (HR:1.75;95%CI:1.05-2.91), while intervention period (HR:0.76;95%CI:0.63-0.91) and insertion of PVC at traumatology ward (HR:0.43;95%CI:0.21-0.85) reduced the risk of catheter failure.

**Conclusions:** We found that unscheduled PVC replacement was very high in all hospitals. The risk of catheter failure varied according to patient comorbidities, days of hospital stay, and type of PVC. The introduction of catheter flushing with pre-filled saline syringes had a significant impact on reducing unscheduled vascular catheter replacement.

## P148

### Prevention of catheter migration by fixation of the breast in a sitting position before implantation of the totally implantable venous access port in women

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**Introduction:** The purpose of this study was to evaluate clinical effectiveness of the breast fixation before implantation of the totally implantable venous access port (TIVAP) to prevent catheter migration in women.

**Method:** TIVAPs were placed in 3,779 women with malignancy from May 2003 to September 2017 (mean age, 56.8 years, range, 13–95 years). Breast fixation was done by application of the adhesive non-woven fabric (Hypafix®) on the naturally dropped ipsilateral breast and abdominal wall in a sitting position before skin disinfection and sterile draping. Implantation of the TIVAP was done in supine position. The patients were divided into two groups according to breast fixation. A total of 1,738 patients received TIVAP placement with breast fixation (Group 1) and 2,041 received TIVAP placement without fixation (Group 2). Medical records were retrospectively reviewed to evaluate incidence of the catheter migration and associated complication. Migration of the catheter was defined as catheter tip in or above the brachiocephalic vein by the breast movement on follow-up in spite of its initial location in or below superior vena cava. Migration by other causes was excluded.

**Results:** Catheter tip migration was developed in 0 patient of the Group 1 and 15 patients (0.7%) of the Group 2. Associated complications were venous thrombosis in 9 patients including 3 patients with swelling of the neck and face and malfunction of the catheter in 7 patient. Explantation of the TIVAP was needed in 10 patients.

**Conclusion:** Breast fixation before implantation of the TIVAP seems to be helpful to prevent migration of the catheter tip which can cause complications and explantation.

**PI49****Addition of passive disinfecting caps for needleless connectors to existing bundle for insertion of central lines reduces central line associated bloodstream infection**

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**Introduction:** Reducing central line associated bloodstream infections (CLABSI) rate to zero is the goal of every ICU. In our general ICU, CLABSI rate was ~6/1000 catheter days (CD) during 2012-2014. After implementation of an insertion bundle and hand hygiene improvement education the rate decreased to ~3/1000 CD. We hypothesized that adding passive disinfecting caps to our maintenance bundle will enable us to achieve the goal of zero CLABSI.

**Method:** During November 2016 we introduced 3M™ Curoc™ disinfecting caps for needleless connectors to our ICU, a 14 bed mixed surgical-medical unit of the largest tertiary center in Israel. We provided the team with educational material and started a surveillance program to reach 100% adherence to capping all the needleless connectors. We continued to monitor CLABSI rate and evaluated the added value of the caps. To assess the decreasing trend in CLABSI rates we used the Cochran-Armitage trend test.

**Results:** Since December 2016 until November 2017, 6 cases of CLABSI were detected, while in the previous year, 11 cases were detected, reflecting CLABSI rate of 1.4/1000 CD vs. 2.9/1000 CD in the previous year. During the 4 year period from 2014-2018, a significant decrease from 6 to 1.4/1000 CD was noted, with approximately 9% decrease per quarter ( $P_{\text{trend}}=0.003$ ). Adding the disinfecting caps led to a reduction of 52% in CLABSI rate.

**Discussion and conclusion:** The passive disinfecting caps are a valuable addition to the CLABSI prevention. Adding this single intervention led to further reduction in CLABSI rate within a year. Further follow up is needed to determine the statistical significance of this single intervention.

**PI50****Reduced incidence of clinically evident PICC-related DVT in sarcoma patients**

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**Introduction:** Upper extremity-deep vein thrombosis (UE-DVT) is well documented in peripherally inserted central catheters (PICCs), particularly in patients with malignancies<sup>1</sup>. Our team of specialist nurses insert around 1000 PICCs per year for oncology and haematology patients. An audit of 1200 PICCs inserted between 2007

and 2010 showed that clinically evident UE-DVT appeared highest in patients with sarcomas (13% versus 6% for the whole group). In July 2013 in response to this finding we started using a new PICC with antithrombogenic properties (BioFlo) for sarcoma patients in the hope of reducing their risk of thrombosis.

**Method:** We audited thrombosis incidence in 163 sarcoma patients with BioFlo PICCs inserted between July 2013 and July 2015. As a control we tracked a group of patients from the same period with colorectal cancer who had a standard (Xcela) PICC. A control group was necessary because of other changes in our practice since the initial data was gathered: namely the introduction of a new securement device (SecurAcath), the use of surgical glue at the exit site, and a general trend towards attempting to maximising vein to catheter ratio<sup>2</sup>.

**Results:** 6% of the BioFlo patients developed clinically evident UE-DVT, comparing favourably with the 13% in our historical data. In the control group the thrombosis rate did not decrease in the same way.

**Discussion & Conclusion:** The data suggests the reduction in thrombosis rate for the sarcoma patients was due to the use of the BioFlo PICC rather than other changes in practice. These results should be interpreted with caution because this was not a randomised controlled trial, the data was gathered retrospectively with limited resources, and most of the sarcoma patients had 5F double lumen PICCs whereas most of the control group had 4F single lumen PICCs.

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**PI51****Submersible anchor joint for fixation of long-term central venous catheters**A.B. Sugak, E.A. Spiridonova, V.V. Selivanov, V.A. Smancer, Y.G. Ovsjannicov, V.V. Shchukin, V.V. Lazarev, A.N. Konstantinova  
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**Relevance:** treatment of patients with hematological profile requires long-term central venous access. One option to provide such access is a tunneled Broviac type catheter, which has a dacron cuff that plays an additional fixative role.

To effectively “ingrow” the cuff, it takes about a month to ensure its immovable position.

To ensure the immobility of the cuff, various versions of anchor joints have been proposed earlier, but they require additional cuts of the skin.

We proposed a submersible anchor stitch to fix the cuff without additional incisions on the skin.

**Materials and Methods:** The study was conducted between January 2013 and February 2018. Tunneled catheters were installed in children aged 1 month to 17 years. Until 01.03.2014, the installation of tunneled catheters was not accompanied by an additional cuff fixation - 206 were installed. In the period from 01.03. 2014, the cuff of all the catheters was additionally recorded by a submerged anchor suture. Similarly, 1003 catheters of the Broviac type were installed.

**Results:** Between January 2013 and March 1, 2014, when the cuff was fixed, during the first two months of operation of the catheters, 10 catheters were accidentally completely removed, which was 4.8%. In addition, in 23 patients (11.1%), the catheter was pulled up during operation prior to the appearance of the cuff at the catheter inlet. After March 2014 to the present time, 14 catheters were accidentally completely removed, which amounted to 0.7%. In 1 case (0.001%), the catheter was displaced before the cuff appeared at the catheter inlet.

**Conclusions:** In the group of patients aged 3 to 17 years, the use of a submerged anchor seam allowed a 7-fold reduction in the frequency of accidental removal of the catheter in the first months of operation, and virtually eliminating the possibility of catheter displacement.

## PI52

### Ultrasound diagnostics of catheter-associated thrombosis in children with oncematological diseases

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**Introduction:** Long-term central venous catheters (CVCs) are the most important factor in the development of venous thrombosis in children. Catheter-associated thromboses (CAT) in most cases are asymptomatic, but can lead to life-threatening complications.

**Objective:** To establish the prevalence and characteristics of CAT in children with oncohematological diseases according to ultrasound (ultrasound).

**Materials and methods:** Ultrasound of the internal jugular, subclavian and proximal divisions of brachiocephalic veins was planned and urgently performed by 568 children with hematological diseases at the age of 2 months to 17 years who were on treatment at the NMIC DGOI them. D.

Rogachev from 1.09.2014 to 28.02.2015. 182 (32%) of the patient were examined in dynamics from 2 to 7 times.

**Results and discussion:** CAT and their consequences were found in 182 (32%) patients. Two types of CAT were identified: type 1 - hemodynamically significant thrombi with complete or incomplete occlusion of the lumen of the vessel and also their consequences; 2 type - hemodynamically insignificant thrombotic overlapping as a “fibrin sheath” on the CVCs or on the walls of the vessel. A part of the children during the observation period was marked by the presence of CAT of different types. CAT 1 type was detected in 54 (9%) patients. CAT of type 2 were detected in 151 (26%) patients. In 80 (14%) children, thrombotic overlays were found on the CVCs as a “fibrin sheath” in the form of a thin echogenic layer with an irregular outer contour around the CVCs that did not interfere with the blood flow.

**Conclusions:** Dynamic ultrasonography of extracranial divisions of brachiocephalic veins made it possible to identify CAT in a third of the examined children with oncohematological diseases and to conduct differential diagnosis between occlusive venous thrombosis and fibrin overlays on the CVCs and vessel walls that have different tactics

## PI53

### Interventional study of care protocols including using ultrasonography to reduce mechanical irritation for the prevention of peripheral intravenous catheter failure

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**Background:** Peripheral intravenous catheter failure is a great concern in the clinical setting. The aim of this study was to investigate the effectiveness of care protocols, including an ultrasonographic “pre-scan” for selecting a large-diameter vein before catheterization, a “post-scan” for confirming the catheter tip position after catheterization by ultrasonography, and the use of a flexible polyurethane catheter to reduce the mechanical irritation that contributes to the incidence of catheter failure.

**Methods:** This intervention study was a non-randomized controlled trial to investigate the effectiveness of care protocols, including “pre-scan”, “post-scan” and “use of polyurethane catheter,” which were compared to the control group, receiving conventional care treatment. All participants were selected from patients in two wards, the respective intervention and control wards, at the University of Tokyo Hospital in Japan, between July and November 2017. Inverse-probability score-based weighted methods (IPW) by propensity score were performed to estimate effectiveness of care protocols. The primary outcome was catheter failure, which was defined as the accidental and

unplanned removal of catheters. We used Kaplan-Meier survival curves to compare rates of time until catheter failure.

**Results:** We analyzed 189 and 233 catheters in the intervention and control groups, respectively. In the control group, 68 catheters (29.2%) were determined to have failed, whereas, in the intervention group, only 21 catheters (11.1%) failed. There was a significant difference between each group in terms of the ratio of catheter failure adjusted by IPW ( $p = 0.003$ ). The relative risk reduction of the intervention for catheter failure was 0.60 (95%CI: 0.47-0.71). Regarding survival analysis, there was significant difference in log rank-test adjusted by IPW ( $p < 0.001$ ).

**Discussion & Conclusion:** Care protocols, including assessment of vein diameter, vein depth, and catheter tip location using ultrasound examination for reducing mechanical irritation is a promising method to reduce catheter failure incidence.

## PI54

### Retrospective analysis of catheter related bloodstream infection in 11014 patients with central venous catheter

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**Introduction:** Center venous catheter is important to the clinical infusion technology, however, catheter-related bloodstream infections have become one of the main reasons for primary bacteraemia, seriously affected the patients survival rate. This article is to review the characteristics of patients with central venous catheterization and provide evidence for nursing care of catheter related bloodstream infection.

**Methods:** The data of patients with 5 years were analyzed retrospectively from January 1, 2013 to December 31, 2017.

**Results:** Within five years, the number of hospitalized patients was 23249, and the number of hospitalized days was 299125. The number of central venous catheters was 11014, the number of catheter days was 123905, and the central venous catheter utilization rate was 41.42%, and the number of patients diagnosed with catheter related bloodstream infection was 21 case, and the incidence rate was 0.17%. Clinically suspected catheter related bloodstream infection, and the removal of the central venous catheter with 298 people, the suspected diagnosis rate is 7.05%. CRBSI patients with fever was 3-35 days, and the longest consecutive fever were 18 days.

**Conclusion:** patients with central venous catheter as intravenous rehydration therapy is an effective means, it have great significance to the patients, the catheter vein infection decannulation increased the economic burden for patients, delay the disease treatment, therefore, clinical treatment,

must careful analysis comprehensive consideration, not only to see his body temperature to tube drawing easily.

## PI55

### The safety care management experiences of 9 patients whose PICC inserted into persistent left superior vena

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**Introduction:** Persistent left superior vena cava is a kind of rare vascular malformation, and it's not easy to be found because patients don't feel any discomfort. Once PICC catheterized into persistent left superior vena cava, patients may be in an unsafe state, so this article aims to provide guidance and reference for clinical nursing care.

**Method:** To sum up safety care management experiences of 11 patients whose PICC was inserted in persistent left superior vena cava in Tianjin Medical University Cancer Institute & Hospital

**Result:** X-rays, Echocardiography, CT imaging review and MRI can help doctors and nurses ensure that patients suffering from superior vena cava malformations: persistent left superior vena cava. Nursing care should be focus on: Properly secure the catheter; The principle of ACL sealing tube should be strictly observed after tube insertion and during the period of tube maintain; To establish special PICC cases files and adhere to follow-up; Strengthen the PICC health care education for patients and their relatives et al. One patient refused to maintain PICC after she was told that her superior vena cava malformations and the hazards of maintain PICC in it, her PICC was immediately removed. Ten patients accepted the truth and finished 4-6 cycles chemotherapy, the function of PICC work well and there were no side effects occurred during the period of catheterization, and were finally removed when patients finished the treatment.

**Discussion:** The safety care management experiences of 11 patients whose PICC was inserted in persistent left superior vena cava offered valuable clinical guidance, and provide reference to our PICC nurse specialist, then the optimized PICC catheterization process ensure cancer patients who need to be inserted PICC can get better quality nursing care services.

## PI60

### Vascular access nurse unit. Seville. Spain

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**Introduction:** Since 2011, the training of nurses in the echoguided insertion of the central venous catheter with the Shelinger technique (PICC) has begun.

Until 2016 the nurses placed PICC in hematology patients and some specialties.

In 2017, the Vascular Access Nursing Unit of the Virgen del Rocío University Hospital was created in Seville, Spain for the insertion of the PICC with the Sherlock methodology, training in primary care and advice on vascular access.

**Materials and methods:** The use of the Sherlock 3CGTM tip confirmation system (TCS) as a guide for the placement of the PICC and to confirm the location of the catheter tip.

Collection of data from patient records

Development of databases of patients with implanted PICC

Data analysis

**Results:** In 2017, 312 PICC were inserted in the Virgen del Rocío University Hospital (HUVR) in Seville, Spain, Hematology 137, Oncology 144, other specialties 30.

The success in insertion was 98.71% with only 4 unsuccessful in relation to greater difficulty in patients who previously had a central venous catheter (CVC).

Of the 312 inserted, 159 were eliminated and 153 remain, with an average of more than 120 days inserted. The motive for remove: Exitus / End of treatment 109; suspected infection 25, catheter tip confirmed + 4; Thrombosis 6; Other reasons (obstruction, accidental exit, change through another central route, migration, voluntary refusal to treatment) 19.

For the attention of the PICC in Primary Care, 61 health centers have been attended and 25 clinical nursing sessions have been carried out during 2017

**Conclusion:** The start-up of the vascular access nurse unit has revealed:

- an increase in the quality of life of the patient from the placement of the PICC until its removal
- the need for continuing education of health professionals.

## P161

### Procedural outcomes of a university nurse led vascular access unit in a Greek general oncology hospital

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**Introduction:** Nurse led vascular access (VA) services have emerged based on the pressure to increase organizational efficiencies and patient outcomes. Most of the dedicated VA nurse teams are limited to peripherally inserted central catheter (PICC) procedures. However the existing literature although limited, suggests that insertion of

centrally inserted central catheters (CICC) by specialist nurses may promote efficiency and minimize adverse events.

**Method:** This is a single center retrospective observational study from a nurse led VA unit of a 250 bed general-oncology hospital in Greece. The unit is operated exclusively by two university degree nurses who perform all the procedures under ultrasound guidance.

**Results:** A total of 1353 procedures were performed in a three years period. Five hundred fifty five CICCs were placed in medical and surgical ward patients (95% IJVs) with a very low complication rate; 1.3% malposition and 0.7% accidental artery puncture. A small number of 92 permanent dialysis catheters were placed in a dedicated suite (77.2% IJV, 9.7% subclavian and 13% femoral veins). The other 706 procedures were 295 PICCs, 302 PICC ports and 109 chest ports placed in oncology patients of our hospital. Approximately 90% of Long term VA devices placement were uneventful. The most common complication in PICCs was accidental removal of the catheter in 7.5% of the patients followed by 1.7% occlusion of the catheter, 1.4% catheter related bloodstream infection (CRBSI) and 1% catheter related thrombosis (CRT). Ports had a significant rate of dehiscence up to 5.1% followed by 2.2% CRT, 1.9% of pocket infection, 0.5% of CRBSI, 0.5% of catheter migration and 0.5% of catheter occlusion.

**Discussion & Conclusion:** This report describes the evolution of an advanced practice nursing role. High procedural success and considerably low complication rates are encouraging and suggest an important role of advanced nursing practice in improving patient health outcomes.

## P162

### Experiences of the first PICC team in Slovenia

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The Department of Infectious Diseases in University medical center Ljubljana treats patients who need a complex antibiotic therapy. Since always, nurses had been having issues with inserting peripheral venous access in patients who are hypervolemic, intravenous drug users and patients with primary diseases.

In January 2017, four nurses from the Intensive Care unit attended workshops about ultrasound at vascular access. On 16th 2017 inserted their first PICC catheter with ultrasound help in basilic vein into the patient who has complex, long weekly antibiotic therapy.

The beginning was difficult because we had the organizational and practical problems. At the Clinic we only had one ultrasound device, so we inserted most of the PICC

catheters in the afternoon when the ultrasound was available. Because of all the positive responses and support from the entire health team, the Head of the department arranged for us to get our own (older) ultrasound device.

From February 2017 until February 2018 we inserted 250 PICC catheters. 61 were inserted in the Intensive care unite, 189 in other departments at the Department for Infectious Diseases.

We had the most problems by determining the appropriate position of the PICC catheter tip because we don't have any device for precisely determining the position of the

catheter tip. In all patients, X-ray chest imaging was performed. Throughout the year we gained experience and further education. We learned maneuvers in case the PICC catheter stayed in a certain position. With this patient, we reduce the number of x-rays of the chest organs.

The authors were inspired that we have succeeded in establishing a first PICC team in a country where nurses and competencies regarding the deployment of PICC catheters are not regulated. Results from the first year confirmed that a specialist team of nurses can insert PICC successfully also in ICU.