

Should we consider preoperative PICC insertion for adult patients undergoing major surgery?

Sonia D'Arrigo¹ , Maria Giuseppina Annetta¹,
Tiziana Iacobucci¹, Alessandra Dottarelli¹
and Mauro Pittiruti² 

Date received: 26 July 2021; accepted: 31 July 2021

Editor

We read with great interest the study by Chiaretti et al.¹ on central venous access devices (CVADs) inserted in pediatric patients prior to major neurosurgery: they compared two different environments for CVAD insertion (procedure room vs operating room) in terms of safety and cost-effectiveness. Interestingly, they focused on the cost of the procedure considering not only the devices, the equipment, and the human resources, but also the costs related to the environment in which the procedures take place.

We believe that preoperative insertion of a CVAD in a setting other than the operating room, on the day before surgery, may have clinical and economic benefits also in adult patients. Such benefit may be even greater if the CVAD is a peripherally inserted central catheter (PICC) rather than a centrally inserted central catheter (CICC).

In our University Hospital, general surgeons are increasingly requesting the insertion of CVADs in their patients on the day before surgery, so to guarantee a reliable venous access in the intra-operative and post-operative period. In most cases, the first choice of our vascular access team is a power injectable polyurethane PICC (single lumen or double lumen, depending on the expected intravenous treatments in the post-operative period), inserted bedside or in a dedicated procedure room. Several economic evaluation studies have compared PICCs with other CVADs in adult cancer patients²⁻⁵ consistently showing that insertion costs are lower for PICCs than for CICCs and ports. Though, such analysis has never been carried out in the population of surgical patients requiring a perioperative CVAD.

We attempted a preliminary evaluation of the cost-efficacy of our current strategy of preoperative insertion of PICCs versus the traditional intraoperative insertion of CICCs, in patients candidate to major surgery. We computed the costs attributable to the two different environments (operating room vs procedure room or bedside),

considering the personnel involved in the procedures and the materials and devices utilized (see Table 1).

The estimated cost of CICC insertion in the operating room is approximately €670; this includes the total cost of the occupation of the operating room, inclusive of the staff, plus the cost of the CICC and of additional materials required for the procedure. We included the additional cost of a post-procedural chest X-ray for tip location, because intracavitary ECG (IC-ECG) is routinely used by our vascular access team but not by our anesthesiologists.

The estimated cost of PICC insertion in the procedure room or at bedside is approximately €271; this includes the mean cost of the PICC and of additional materials required for the procedure. We included the additional cost of the subcutaneously anchored securement, which our vascular access team adopts in the majority of PICC insertions.

According to this simulation, insertion of PICC before major surgery seems to be associated with an average cost reduction of >50% if compared to the traditional strategy of last-minute insertion of CICC in the operating room. Although the raw cost of the device is somehow higher for PICCs than for CICCs, the overall cost advantage seems to be mostly related to the high cost of maintaining the operating theater in activity, just as showed in the study by Chiaretti et al.¹

¹Department of Anesthesia and Intensive Care, Fondazione Policlinico Universitario 'A. Gemelli' IRCCS, Università Cattolica del Sacro Cuore, Rome, Italy

²Department of Surgery, Fondazione Policlinico Universitario 'A. Gemelli' IRCCS, Università Cattolica del Sacro Cuore, Rome, Italy

Corresponding author:

Sonia D'Arrigo, Department of Anesthesia and Intensive Care, Fondazione Policlinico Universitario A. Gemelli IRCCS, Università Cattolica del Sacro Cuore, Largo Gemelli 8, Roma 00168, Italy.
Email: sonia.darrigo@policlinicogemelli.it

Table 1. Preliminary evaluation of the cost-efficacy of our current strategy of preoperative insertion of PICCs versus the traditional intraoperative insertion of CICCs, in patients candidate to major surgery.

	CICC inserted in operating room	PICC inserted in procedure room/bedside
Cost of materials		
Mean cost of the CVAD	20	60
Insertion pack including the maximal barrier protections (cap, mask, sterile gown, full body drape), perforated drape, sterile cover for the probe, sterile gel, cable for IC-ECG method, transparent semipermeable dressing	25	25
Chlorhexidine applicators	2	2
Sterile gloves, local anesthetic, cyanoacrylate glue	8	8
Skin-adhesive sutureless device	5	–
Subcutaneously anchored securement	–	30
Total (€)	60	125
Cost of the operating room (mean cost/h): occupation and staff		
Hourly cost of the operating room	500	–
Anesthetist performing the procedure	65	–
Assistant nurse during the procedure	30	–
Cost of the procedure room/bedside (mean cost/h): occupation and staff		
Hourly cost of procedure room/bedside		80
Nurse of the vascular access team performing the procedure		36
Assistant Nurse during the procedure		30
Total (€)	595	146
Cost for assessing tip location		
Post-operative: X-chest ray	15	
Intra-operative: IC-ECG method		–
Total cost (€)	670	271

We could hypothesize that there might also be some relevant clinical benefits for the patient in terms of safety when a PICC is inserted and used in the perioperative period (less radiation exposure, less risk of pleuropulmonary complications, more comfort, easier management of the dressing, etc.).

Further studies are warranted to assess the actual magnitude of these estimated economic advantages, and to verify the postulated clinical advantages in terms of safety, efficacy, and patient comfort.

Declaration of conflicting interests

The author(s) declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

Funding

The author(s) received no financial support for the research, authorship, and/or publication of this article.

ORCID iDs

Sonia D'Arrigo  <https://orcid.org/0000-0001-6740-3195>

Mauro Pittiruti  <https://orcid.org/0000-0002-2225-7654>

References

- Chiaretti A, Pittiruti M, Sassudelli G, et al. Comparison between sedation room and operating room in central venous catheter positioning in children. *J Vasc Access* 2021; 22(2): 184–188.
- Fang S, Yang J, Song L, et al. Comparison of three types of central venous catheters in patients with malignant tumor receiving chemotherapy. *Patient Prefer Adherence* 2017; 11: 1197–1204.
- Patel GS, Jain K, Kumar R, et al. Comparison of peripherally inserted central venous catheters (PICC) versus subcutaneously implanted port-chamber catheters by complication and cost for patients receiving chemotherapy for non-haematological malignancies. *Support Care Cancer* 2014; 22(1): 121–128.
- Martella F, Salutari V, Marchetti C, et al. A retrospective analysis of trabectedin infusion by peripherally inserted central venous catheters: a multicentric Italian experience. *Anticancer Drugs* 2015; 26(9): 990–994.
- Horattas MC, Trupiano J, Hopkins S, et al. Changing concepts in long-term central venous access: catheter selection and cost savings. *Am J Infect Control* 2001; 29(1): 32–40.