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Insertion site assessment of peripherally inserted central catheters: Inter-observer agreement between nurses and inpatients

***Joan Webster**
Royal Brisbane and Women's Hospital, Herston, QLD, Australia
Alliance for Vascular Access Teaching and Research (AVATAR), Menzies Health Institute Queensland, Griffith University, Nathan, QLD, Australia. Queensland University of Technology, Kelvin Grove, QLD, Australia. Postal address: Royal Brisbane and Women's Hospital, Level 2, Building 34, Butterfield Street, Herston, QLD 4029, Australia. Email: joan.webster@health.qld.gov.au

Sarah Northfield
Royal Brisbane and Women's Hospital, Herston, QLD, Australia
Queensland University of Technology, Kelvin Grove, QLD, Australia

Emily N Larsen
Royal Brisbane and Women's Hospital, Herston, QLD, Australia
Alliance for Vascular Access Teaching and Research (AVATAR), Menzies Health Institute Queensland
Griffith University, Nathan, QLD, Australia

Nicole Marsh
Royal Brisbane and Women's Hospital, Herston, QLD, Australia
Alliance for Vascular Access Teaching and Research (AVATAR), Menzies Health Institute Queensland
Griffith University, Nathan, QLD, Australia

Claire M Rickard
Royal Brisbane and Women's Hospital, Herston, QLD, Australia
Alliance for Vascular Access Teaching and Research (AVATAR), Menzies Health Institute Queensland
Griffith University, Nathan, QLD, Australia

Raymond J Chan
Royal Brisbane and Women's Hospital, Herston, QLD, Australia
Alliance for Vascular Access Teaching and Research (AVATAR), Menzies Health Institute Queensland
Griffith University, Nathan, QLD, Australia
Queensland University of Technology, Kelvin Grove, QLD, Australia

*Corresponding author

ABSTRACT

Introduction: Many patients are discharged from hospital with a peripherally inserted central catheter in place. Monitoring the peripherally inserted central catheter insertion site for clinical and research purposes is important for identifying complications, but the extent to which patients can reliably report the condition of their catheter insertion site is uncertain. The aim of this study was to assess the inter-observer agreement between nurses and patients when assessing a peripherally inserted central catheter site.

Methods: The study was based on inpatients who were enrolled in a single-centre, randomised controlled trial comparing four different dressing and securement devices for peripherally inserted central catheter sites. A seven-item peripherally inserted central catheter site assessment tool, containing questions about the condition of the dressing and the insertion site, was developed. Assessment was conducted once by the research nurse and, within a few minutes, independently by the patient. Proportions of agreement and Cohen's kappa were calculated.

Results: In total, 73 patients agreed to participate. Overall, percentage agreement ranged from 83% to 100% (kappa = .65–.82). For important clinical signs (redness, swelling, ooze, pus and tracking), there were high levels of percentage agreement (99%–100%).

Conclusion: The high level of agreement between nurse–patient pairs make the instrument useful for assessing peripherally inserted central catheter–associated signs of localised infection, allergic or irritant dermatitis or dressing dislodgement in a community setting.

Keywords: Observer variation, central venous catheters, inter-observer agreement, patient-reported outcomes.

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BACKGROUND

Due to innovations in medical techniques, models of care and care processes, the average length of stay in acute hospitals has been steadily falling[1]. These efficiencies have led to many more patients receiving post-hospital care, through schemes such as 'hospital-in-the-home' or other forms of community care[2]. In addition, patients may also be referred directly to community services from emergency departments, avoiding hospital admission altogether[3]. While these new models of care may lead to shorter lengths of stay and reduced inpatient-related costs[4], they pose significant problems for researchers and clinicians, who may need to monitor patients for longer periods of time, but without the high cost associated with in-home visits.

A common medical intervention that is increasingly being transferred to community care is the administration of long-term antibiotics, chemotherapies or other parenteral therapies[5,6]. These therapies are frequently administered through a peripherally inserted central catheter (PICC), where rates of failure, due to occlusion, thrombosis, accidental removal, suspected blood stream infection and so on, may be as high as 15%[7]. Patients receiving such therapies may also be enrolled in clinical trial/s, which require frequent monitoring of the insertion site. For cancer patients, who are immunocompromised due to their antineoplastic therapy, such monitoring is particularly important. As a consequence, patients usually return to the hospital for assessment, involving financial, physical and social burden. One solution for long-term catheter-related follow-up would be patient-reported outcomes, but this is problematic if such measures have not been validated.

We know from inter-observer agreement studies that concordance between health care professionals is low for many conditions[8,9]. However, in related work, an acceptable level of inter-observer agreement was found when two nurses independently rated the condition of peripheral intravenous catheter (PIVC) sites[10]. The high level of agreement between two nurse raters may have been established because both were experienced intravenous (IV) access researchers or it may be that complications associated with an IV access site are less ambiguous than for other catheters such as PICCs.

At our hospital, approximately one-quarter of patients who have a PICC line inserted are outpatients. So, to reduce the burden of hospital visits, we were interested to understand the reliability of patient's own assessment of their PICC insertion site. If assessment was found to be consistent between the patient and an expert assessor, it would allow us to use such patient-reported outcome data with confidence for both clinical and research purposes. Consequently, the aim of this study was to assess the inter-observer agreement between a nurse, experienced in management of IV access devices, and a patient, enrolled in a clinical trial.

METHODS

Participants and setting

The study centre was a tertiary referral teaching hospital with over 900 beds, located in South East Queensland, Australia. Between March 2014 and March 2015, 124 patients admitted to cancer care, medical or surgical wards, and who required a PICC were recruited to a single-centre, pilot randomised controlled trial (RCT). The four-arm trial was designed to test the feasibility of processes for a larger RCT, comparing the effectiveness of PICC dressings and securement devices. The trial's primary outcome was any reason that led to catheter failure (catheter-associated blood stream infection, local infection, total or partial dislodgement, occlusion, thrombosis and/or PICC fracture). As part of the trial, we conducted an inter-observer agreement study of enrolled patients. The study protocol for the RCT and for the inter-observer agreement study was approved by the ethics committees of the hospital (HREC/13QRBW/454) and university (NRS/10/14/HREC). We registered the trial with the Australian and New Zealand Clinical Trials Registry (ACTRN12616000027415).

Data collection

For the inter-observer agreement study, a seven-item PICC site assessment tool (PICC-SAT) was developed by the investigators, based on recommended criteria for dressing integrity[11] and commonly recognised signs and symptoms for phlebitis and local infection[12]. The tool contained four items to assess the integrity of the dressing and three items to measure visible and palpable signs of infection and inflammation (Figure 1). All core items required a yes/no answer. We also included one optional item, which asked participants to name any additional product used to secure the dressing (e.g. tape and/or elasticised tubular bandage). Face validity was initially tested with six nurses experienced with IV access. Subsequently, five patients were asked to assess the instrument for readability and comprehension. Following feedback from these groups, wording for some questions was slightly modified. During the RCT, the PICC site was inspected daily by a research nurse, to check for protocol compliance and study outcomes. During one of these assessment visits, and at least two days after PICC insertion, the research nurse (an experienced registered nurse with training in PICC site assessment) asked the patient for consent to participate in the inter-observer agreement sub-study. If the patient agreed, the site assessment was conducted once by the research nurse and, within a few minutes, independently by the patient who was blinded to the nurse's assessment.

Analysis

First, we used observer agreement as suggested by De Vet *et al.*[14] because it is the most appropriate way to establish an absolute measure of agreement between two people rating categorical variables such as 'present or yes' and 'not present or no'. Using a