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Optymalizacja dostępu naczyniowego u pacjentów hospitalizowanych – znaczenie cewników pośrednich i ultrasonografii w praktyce pielęgniarskiej

Optimization of Vascular Access in Hospitalized Patients – The Importance of Midline Catheters and Ultrasonography in Nursing Practice

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Optimization of Vascular Access in Hospitalized Patients – The Importance of Midline Catheters and Ultrasonography in Nursing Practice

Aim of the Study: The aim of this dissertation was to provide a comprehensive evaluation of the effectiveness and safety of midline catheters (MCs), as well as the role of ultrasonography (US) in optimising vascular access, encompassing both nursing competencies and patient clinical outcomes.

Materials and Methods: The analyses were conducted in four complementary stages: (1) an online survey among 127 nurses from six hospital wards (15 October–15 November 2023), assessed using the Mann–Whitney U test, Kruskal–Wallis ANOVA and Pearson's *r*; (2) a narrative review of the literature from 2013–2023 concerning the application of ultrasound in nursing procedures; (3) a retrospective analysis of the medical records of 341 patients who received a midline catheter between 2021 and 2023, assessing dwell time and complication rates; (4) a case study of a patient with thrombocytopenia (<20,000/mm³), in whom the use of an MC avoided the need for a central vascular access device (CVAD).

Results: *Survey findings:* Nearly all respondents (126/127; 99.2%) had prior experience with MCs. The mean rating of their usefulness was 4.44 ± 0.65, and the mean self-assessed knowledge level was 4.26 ± 0.68 (scale 1–5). A total of 88% (110/125) expressed willingness to pursue further training. A shorter duration of professional experience correlated with higher motivation ($Z = 1.979$; $p = 0.048$).

Narrative literature review: The reviewed studies consistently demonstrated that ultrasound-guided needle insertion increases first-attempt success rates by 20–30%, reduces procedural time by an average of four minutes, and lowers the risk of mechanical complications by ≥40% compared to landmark techniques.

Retrospective analysis: The mean dwell time of MCs was 12 days; in 46.9% of cases, the catheter was removed electively after therapy completion or patient death. Catheters of 15 cm in length had a significantly longer dwell time and fewer complications than 20

cm catheters ($p < 0.05$), highlighting the importance of individualised catheter length selection. The use of MCs avoided the need for CVAD implantation in a substantial proportion of patients requiring mid-term infusion therapy.

Case study: In a haematology patient, the midline catheter facilitated 14 days of therapy without thrombotic, infectious, or mechanical complications, effectively serving as an alternative to a CVAD.

Conclusions: Midline catheters constitute a safe and effective alternative to central vascular access for therapies lasting from several days to a few weeks. The integration of ultrasonography significantly improves first-attempt success rates and reduces complication incidence. Continuous nurse training is essential to fully realise the potential of MCs. Recommendations include: standardisation of qualification, insertion, and care protocols for MCs; mandatory ultrasound training for nursing staff; development of interdisciplinary vascular access teams; and prospective cost-effectiveness studies comparing MCs and CVADs across various clinical populations. Implementation of these recommendations may markedly enhance the safety and efficiency of infusion therapy in hospital settings.