Healthcare practitioner perspectives and experiences regarding vascular access device data: An exploratory study.

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Declarations

Jessica Schults reports investigator-initiated research grants from Becton Dickinson unrelated to this project.

Christine Woods reports no conflicts of interest.

Marie Cooke reports investigator-initiated research grants and speaker fees provided to Griffith University by vascular access product manufacturers (Baxter, Becton Dickinson, Entrotech Life Sciences), unrelated to this project.

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Claire Rickard reports investigator-initiated research grants and speaker fees provided to Griffith University from vascular access product manufacturers (3M, Angiodynamics; Baxter; BBraun; BD-Bard; Medtronic; ResQDevices; Smiths Medical), unrelated to this project.

Biographical Sketch

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Abstract

Background: A vascular access registry is a key strategy proposed to improve patient safety and quality, but its impact will be shaped by the attitudes, experience and resources of end-user stakeholders. This study aimed to examine stakeholders' perspectives and experiences regarding the feasibility and utility of a standardised platform to collect vascular access data and to identify potential barriers and facilitators of a vascular access clinical quality registry.

Methods: Individual (n=17) and group (n=1) semi-structured interviews were conducted between October–December 2018 with directors from various healthcare disciplines and policy makers in Australian healthcare facilities. Interviews were recorded, transcribed and analysed using inductive thematic analysis.

Results: Overall, participants supported the idea of a standardised platform to capture vascular access data. Three main themes were identified: 1) data challenges (sub themes: standardised data capture, data quality and data sharing); 2) staff capability (lack of resources and feeling unsupported); and 3) logistics (resource capacity and implementation challenges).

Conclusion: Stakeholder engagement and universal agreement on standardised vocabulary and data items are vital to registry development, implementation and sustainability. Continuous iterative cycles will be required to reflect upon, review and improve the processes around vascular access data collection using a standardised registry software platform.

Key words: Vascular Access Devices, Interview, Registries, Outcome Assessment

Introduction

Approximately 86% of hospital inpatients require the insertion of a vascular access (VA) device to facilitate medical treatment ¹ as well as many in the community. Health purchasing data and population estimates indicate around 15 million vascular access devices are purchased in Australia alone each year ². Despite their ubiquitous use, rates of device complication and failure are high, with 1 in 4 centrally placed catheters, and 1 in 3 peripherally inserted devices failing prior to indication cessation ^{3 4}. This high incidence of failure is a global patient safety issue contributing to significant patient harm and wasting scarce healthcare resources.

The provision of timely, reliable data on patient care processes and outcomes have been shown to drive improvements in the quality of health care ⁵⁻⁷. However, at present, healthcare systems lack standardised methods for collecting, reporting, and benchmarking VA data to drive practice improvements ^{8 9}. Further, differences in local VA databases' vocabulary and items make attempts to analyse comparable data challenging ⁸. Clinical quality registries (CQRs) provide an opportunity to address these gaps, offering a standardised platform to monitor performance and benchmark practice nationally, with appropriate coverage.

Increasing government and organisational investment in CQRs in recent decades has seen the establishment of several national/international registries such as the Australia and New Zealand Prostate Cancer Outcomes Registry ¹⁰, Australia and New Zealand Intensive Society Registries ¹¹ and local jurisdiction registries such as the Victorian Cancer Registry, a population-based registry with more than 240 hospitals and 30 pathology laboratories contributing data ¹². A recent economic evaluation of five Australian CQRs demonstrated

registries can be a cost-effective method for improving the quality of care and patient outcomes, finding a 2–7 times cost benefit from established registries¹³.

The development and implementation of a VA registry will optimise the collection and comparison of national VA data and drive improvements in patient care and outcomes. To date, no work has been conducted to explore key stakeholders' perceptions of a VA registry or factors that influence the sustainability or coverage of such a platform. This work is necessary to broaden the useability and benefits of a VA registry and promote equitable improvements in patient care and outcomes across national healthcare services in the field of VA¹⁴. Therefore, the objective of this study was to examine stakeholders' perspectives and experiences regarding the feasibility and utility of a standardised platform to collect VA data and to identify potential barriers and facilitators of a VA CQR.

Methods

2.1 Qualitative approach

A descriptive, exploratory study. Seventeen semi-structured interviews (1 group interview involving two stakeholders) were conducted with key individuals responsible for policy directives and VA data from a range of healthcare disciplines across Australia. The study is reported using the Standards for Reporting Qualitative Research (SRQR)¹⁵.

2.2 Researcher characteristics and reflexivity

The research team comprised four females including one research fellow, a senior research assistant and two Professors of Nursing (PhD). Interviews were facilitated by two independent senior clinical nurse researchers (JS, CW), both with postgraduate qualifications and previous experience in VA research and interviewing. The researchers had no authority

or reporting relationship with attendees, thus allowing for open honest discussion. The stakeholder-researcher relationship was one that allowed the researcher to gain a deep understanding of the participants' perceptions and experiences while maintaining a professional relationship ¹⁶.

2.3 Setting

The study captured healthcare professionals' perspectives from four Australian states (Queensland, New South Wales, Victoria, Western Australia). Interviews were conducted in person, in an office outside of the clinical environment or via telephone. Only the interviewer and participant were present during the interview.

2.4 Participant selection

A purposive sampling approach was used to recruit participants ¹⁷. Stakeholders were invited to participate in the study if they had experience with the collection, analysis and reporting of VA data. An email was sent to professional organisations (e.g. Australian Vascular Access Society) advising them of the study and inviting participation. Contact details for the chief investigator (CI) were provided. Sample size was not defined *a priori*, and data were gathered until saturation was achieved, that is, when no new information was being identified in interview data ^{18 19}.

2.5 Ethical considerations

Ethics approval was obtained from the University Human Research Ethics Committee (GU2019/329/HREC). Written informed consent was obtained prior to the interview which was audio recorded. Recorded responses were de-identified and audio transcripts did not contain identifiable information.

2.6 Data collection methods and instruments

Interviews were conducted from October to December 2018. To ensure consistency, an interview guide was used and participants were asked identical open-ended questions^{18 20} (Supplementary material 1). The interviews included both descriptive and structured questions²¹. Questions ($n=8$) were based on key areas related to vascular access derived from existing literature reviews and quality activities^{8 22 23}. Follow-up questions and prompts were adapted based on participant responses during the interview, allowing a more individualised approach²⁴ and full exploration of participant experience. All interviews were independently transcribed verbatim for accuracy¹⁶. Interview duration was approximately 30 minutes.

➤ Supplementary material 1. Guiding questions asked to key stakeholders

2.7 Data analysis

Inductive thematic analysis was used to code and analyse interview data. Analysis was as per Braun and Clarke's six phases of thematic analysis: i) familiarising with data, ii) generating initial codes, iii) searching for themes, iv) reviewing themes, v) defining and naming themes, and vi) producing the report²⁵. Following full transcription, interview data were coded by CW. Initial codes were generated using line-by-line coding (facilitating an audit trail) and a process of writing and grouping like ideas and patterns. Codes then informed concept formation, and themes and sub-themes were identified by consensus (CW, JS, MC). Themes were reviewed and defined with continued reference to codes and raw data via discussion with the project team¹⁸.

2.8 Reliability

Authenticity was addressed through fairness (transparent study recruitment process). Further, investigators maintained a degree of reflective awareness of preconceptions and expectations throughout the data collection period ²⁶.

3.0 Results

3.1 Sample characteristics

Table 1 outlines participant characteristics. The majority of participants originated from Queensland ($n=11$, 58%). Most participants were from the discipline of nursing, however, participants filled executive, clinical and academic positions across health services, universities or affiliated patient safety organisations, including health informatics branches.

Table 1. Participant characteristics

Demographic data		Number of participants n= 19 (%)
Location	Queensland	11 (58)
	New South Wales	4 (20)
	Victoria	2 (11)
	Western Australia	2 (11)
Specialty	Nursing	12 (63)
	Medicine	4 (21)
	Patient Safety	2 (11)
	Healthcare Informatics	1 (5)
Position	Executive/Director	6 (32)
	Manager	4 (21)
	Senior Clinician	7 (37)
	Academic	2 (10)

3.2 Themes

Overall, participants endorsed the idea of a vascular access CQR while identifying a number of perceived barriers and facilitators. Three major themes were identified: 1) data challenges; 2) staff capability; and 3) logistics. The final themes and subthemes are presented in Figure 1.

Figure 1. Final thematic map

3.2.1 Data challenges

Standardised data capture

Participants perceived a lack of standardised VA data collection across healthcare institutions ‘*There’s really nothing out there*’ (S08) and ‘*we don’t even know what our line days are*’ (S03). Across stakeholders, several local VA databases were identified, however, the majority of participants described their current approach to collecting VA data as ‘*none*’, ‘*ad hoc*’ or ‘*opportunistic*’. Overall, participants expressed frustration with current systems and a desire for ‘*...a standardised approach (to VA data collection) ...to benchmark practice*’ (S05). Universal agreement on item definitions was discussed, alongside the importance of standardising which items to collect. There were notable exceptions to this, such as nationally-mandated central line-associated blood stream infection (CLABSI) surveillance; ‘(we certainly monitor) *CLABSI, because I have to report on that*’ (S05). Beyond infection outcomes, most participants believed few other VA outcomes were routinely tracked or benchmarked nationally.

Data quality

Of the ‘*very little*’ data routinely collected at participants’ healthcare institutions, concerns regarding data ‘*reliability*’ and ‘*quality*’ were described. ‘*It’s very hard to maintain or assess the quality, ... there’s no accountability*’ (S04). ‘*People are collecting the data*’, however, assessing the ‘*quality of the data*’ is difficult (S05). One participant stated, ‘*We currently rely on what people document, and that (at) the moment is incredibly poor*’ (S02), with another reporting ‘*People don’t ... document*’ (S06). Participants discussed the importance of ensuring data quality, accuracy and reliability, which they perceived would enhance data useability, particularly for reporting purposes that might influence practice/policy change.

Data sharing

Participants reported VA data were generally poorly communicated across the organisation, and if data were shared it was typically in-house. *‘It’s important for the clinicians to have a very visible awareness (of the data) particularly in the inpatient setting’* (S11). The majority of participants felt there was little dissemination of data across facilities with the exception of CLABSI, a mandatory reporting measure. There is *‘poor access and visibility’* (S09) of VA data across staff, departments and facilities. Participants reported needing VA data for CVAD, patient safety or executive meetings. However, *‘the data, it’s just ours’* (S06) indicates a lack of quality data to share and comparable data to show improvement. Participants expressed the desire to benchmark outcomes, but were concerned with data quality, standardisation of data items and an appropriate method of cross-institutional data sharing:

‘if there are problems with our outcomes ... and that’s picked up on that central registry, then I think that’s a bonus and that’s something that we can action and work on, but I guess if that was kind of used in a negative manner ... I think from an organisational perspective, they may have a few issues with that.’ (S13)

3.2.2 Staff capability

Overall, participants reported a lack of resources to facilitate VA data collection, despite expressing positive attitudes to the value of this data. Lack of funding and personnel were highlighted as key issues. Other issues described were the absence of registry software, standardised VA data items and vocabulary and analytical support to make ‘sense’ of the data. *‘We currently don’t have the ability to run reports, ... there is some data available, but you would have to collect it manually and that would just be nigh impossible’* (S02).

Stakeholders perceived this data to be necessary to drive improvements in the quality of patient care related to VA. Describing the lack of resources to collect this data as ‘*very frustrating*’ (S02).

Several participants reported feeling unsupported to undertake VA data collection, explaining VA data collection is ‘*Not encouraged within (my discipline)*’ (S01), making it hard for clinicians to instigate routine, standardised VA data collection. Some stakeholders perceived the lack of support from upper management as reflecting a lack of awareness of the importance of tracking VA device and patient outcomes. ‘*My voice is quiet in the wilderness*’ and ‘*they don’t see the benefit (of collecting the data)*’ (S04). The perception ‘VA data collection is someone else’s problem’ arose when discussing who is responsible for collecting and reporting VA data: ‘*We would leave that for the vascular access service*’ (S09). There was an understanding that the organisation and management of practice meant there was an ongoing need to develop structures and processes in this space, but there was not a clear sense of who would be responsible for the innovation. Clinical stakeholders reported the need to persevere in pushing for quality VA data: ‘*We will report back to whatever [sic] people we can get to listen*’ (S10), ‘*It’s a change management process*’ (S03) getting people on board, and ‘*We continue to remind people that we don’t (have) any meaningful data*’ (S02).

3.2.3 Logistics

Resource capacity

Across stakeholders, access to funding to support registry infrastructure was highlighted to be a pivotal driver in the development and implementation of a VA CQR. ‘*There is a lot of interest in this space*’ (S07), but ‘*we’re constantly told there’s no money*’ (S02). If registry software existed, participants expressed concern in relation to who would be

responsible for the data collection: *'Who's funded – to collect the information? It's quite laborious'* (S07); it would need *'data linkage'* (S03). However, participants named multiple benefits of participation. Stakeholders reported a salient driver to engage in an established VA CQR was the ability to meet accreditation and national reporting requirements. A further motivator to engage in a VA CQR was the ability to improve VA practices and patient outcomes in their facility. However, engaging in a VA CQR was associated with considerable tangible and intangible costs, with discussion focussed on the electronic integration rather than individual operators to collect data.

Implementation challenges

Most participants believed there was positive interest in participating in a VA CQR, which would *'raise the bar'* on the quality and safety of care patients requiring VA devices receive. There were reservations expressed regarding the challenges of implementing a VA registry. It must be *'sustainable'* (S03). Participants described the need for multi-level buy-in *'for compliance and quality control'* (S07) and to ensure the successful integration of the VA CQR in the clinical setting, *'It would have to come from the executive, ideally need to be integrated into our systems, easily accessible'* (S12).

Understanding the practice context and *'knowing your audience'* was also highlighted by stakeholders as vital to ensuring the ongoing success and sustainability of the VA CQR. When asked what data they would want, stakeholders named a host of variables including device appropriateness, complications (infection, thrombosis, occlusions and cause of device failure), dwell time, idle catheters, number of insertion attempts, reason for removal and more. The importance of measuring the impact of the VA CQR was discussed, stressing the

need for clear, consistent data outputs that can be disseminated at various system levels to quantify the benefit of the registry.

Limitations

This study has some limitations. The study scope did not enable the ascertainment of perspectives outside of Australia, which limit the generalisability of study findings to other countries and healthcare contexts. Further, the focus of this study was to ascertain the perspectives and experiences of stakeholders, and we did not analyse participant characteristics such as gender or age to see if there was an association with viewpoints.

Discussion

To our knowledge, this is the first study to draw from a broad range of VA stakeholders within Australian healthcare facilities. A key finding of the study was that stakeholders perceived the current state of VA data collection to be sub-optimal. VA data collection occurred in siloed departments within some facilities; however, in other facilities VA data collection was non-existent. Furthermore, participants reported diversity in the items collected and noted several challenges aggregating and comparing data. These findings align with international reports which describe a lack of standardised vocabulary and platforms to monitor VA care and outcomes^{8 27}. This issue largely stems from a lack of standardised VA device nomenclature, core outcomes and consensus-derived quality indicators, which other disciplines have shown positively enhances clinicians' ability to compare patient and medical device data²⁸⁻³⁰.

There were more nuanced perceptions of a VA registry, with participants describing the potential benefits and value-add of a standardised system. Despite this, key stakeholders

highlighted some realistic challenges, including ensuring data integrity, flexibility for practice context, resource and policy implications, and having a transparent governance infrastructure. Given the resources required to establish and maintain a CQR, a pragmatic approach to registry implementation is needed when setting up a new system ³¹. A standardised minimum dataset is the first step in developing a VA CQR ³¹, however, achieving interoperability between the registry dataset and source data is a fundamental consideration that impacts the value and useability of the VA CQR. With the roll-out of electronic medical records across a number of Australian States and Territories it is important to consider how the registry's dataset maps with source systems, a consideration that has significant resource implications when tracking performance across institutions ³². In recognition of this, several projects are being undertaken to improve interoperability between registries and EMR internationally, however, much more work is needed in this space in the Australian context ³³.

There are likely to be considerable patient, organisation and health economic benefits from the implementation of a VA registry. To achieve high coverage across facilities, data items need to be developed in partnership with clinicians and consumers. Stakeholders reported a need for more comprehensive monitoring of VA outcomes beyond infection, particularly venous thromboembolism. This finding aligns with a recent scoping review that found comparative VA data assessment predominantly focuses on infectious hospital-acquired complications ⁸. Further, using a predefined minimum dataset, registries enable the systematic and efficient collection of clinical data, which may include patient reported outcome measures (PROMs) that may otherwise not be assessed ³⁴. The ability of registries to standardise the capture of PROMs has been demonstrated nationally by the Victorian Prostate Cancer Registry and the Victorian Severe Trauma Registry, which collect PROMs during a time of clinical stability. Internationally, countries such as Sweden ³⁵ and the UK ³⁶ collect

PROMs with hip or knee arthroplasties, with annual reports published on government or registry websites.

The establishment of a VA CQR has important policy and practice implications for Australian healthcare, as noted by the executive respondents in these interviews. Australia's Health Performance Framework (AHPF) includes a focus on technological advancement and efficiency, supported by health system infrastructure. Participants perceived a key driver of registry value was software interoperability with EMR and national surveillance systems. Accrediting bodies including the Australian Council on Healthcare Standards (ACHS) may see flow-on benefits from the establishment of a standardised data capture tool which facilitates mandatory reporting/surveillance of important quality measures such as CLABSI. For example, in 2020, the Australian Commission on Safety and Quality in Healthcare (ACQSHC) will release a new National Peripheral Venous Access Clinical Care Standard that will require data indicators against which compliance and ultimately organisational accreditation can be assessed ³⁷. An initial focus on accreditation outcomes may facilitate the early implementation of a VA CQR, through performance benchmarking.

Conclusion

Currently, there is a lack of comparative data in the Australian health system related to VA device insertions, complications and costs (personal for the patient and economic for the organisation). The development of a VA CQR has the potential to provide important quality and safety data and a platform for improving patient outcomes and experiences. These insights should encourage the ongoing development of a VA registry and inform processes to minimise potential barriers to its sustainability and ongoing useability.

Implications

This study identified important implications for the establishment of a VA CQR. First, stakeholder engagement is crucial for the development, refinement and implementation of the system to ensure sustainability. The resource burden on individual participating centres should be minimised and interoperability between the registry software and EMR maximised. Second, standardisation of data items and registry processes is necessary to ensure data quality and useability. Finally, adding value to healthcare institutions through performance measurement, in particular, national surveillance and accreditation standards, will promote engagement with the registry.

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Supplementary material 1. Guiding questions asked to key stakeholders

Guiding questions

- Have you had any experience with clinical quality registries?
 - When you think about vascular access services delivered by your institution or in healthcare more broadly, what information is currently available to assess quality and any problem areas for improvement?
 - Of the data that is currently recorded or available about vascular accesses devices, what is your experience of how this data is currently used?
 - If there was a registry for vascular access, what are the most important things you would want it to track from the data in your institution, or in health services more broadly?
 - If a registry was available now, do you think your institution or an average hospital would be interested to join the registry?
 - From the registry example shown, which elements would be most useful and why?
 - For times when the registry indicated inconsistent or poor quality outcome data, how would you think that could be best displayed?
 - Is there anything else that you think we should consider, or you would like to comment on with regards to the development of a vascular access registry?
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