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Special issue

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Editorial

The *AJCN* aims to provide a forum where debate and the exchange of views can take place. We welcome papers on contemporary professional policy or practice issues of concern and interest to cancer nurses.

Notes for contributors

All correspondence relating to the journal should be directed to the editors. Guidelines for contributors to the journal can also be obtained from the editors. The *AJCN* is published twice a year.

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Editorial: voice, visibility and research

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In her powerful book *From silence to voice: what nurses know and must communicate to the public,* Suzanne Gordon[1] asks us to consider what would happen if "the voice and visibility of nursing were commensurate with the size and importance of the nursing profession".

The COVID-19 pandemic has given the world insight into our importance and has elevated our visibility. But, even as the pandemic continues to ravage large parts of our globe, governments are already demonstrating a profound case of short-term memory loss about promises made to elevate educational opportunities, salary and a place at the policy table for nurses in response to our contribution during the pandemic[2,3]. Why is this? The reasons are complex, long-standing and engrained, and the magnitude of effort needed to address them are clearly detailed in the WHO's *State of the world's nursing, 2020*[4]. However, I believe that nurses have access to an underutilised resource, a secret weapon, that, if used effectively, can raise the voice, visibility and importance of nursing – *research.*

In 2016, the Victorian Comprehensive Cancer Centre (VCCC) was launched. The VCCC is an alliance of 10 organisations, including seven clinical, one university and two research institutes, funded by the Victorian Government (https://www.viccompcancerctr.org). Its mission is to turn the potential of the critical mass and expertise of multidisciplinary clinicians, consumers, researchers and scientists into best possible outcomes for Victorians affected by cancer. One of the flagship programs of the VCCC is the Nurse-Led Research Hub (the Hub) (https://www.viccompcancerctr.org/what-we-do/research-development/nurse-led-research/). Established to develop cancer nursing research capability, the Hub uses multiple strategies and activities to support nurses to engage in research such as: an online information-sharing forum; free education sessions and workshops; supported research secondment opportunities; training and mentoring; and access to funds for research projects.

In this edition of the *Australian Journal of Cancer Nursing,* three nurse-led research initiatives are reported. The authors of the profiled papers were recipients of competitively awarded funding provided by the VCCC Hub to carry out clinical research projects. To be eligible for funding, the nurses had to engage nurses from across VCCC alliance organisations, creating opportunity to build or strengthen research networks and collaborations, and maximise visibility of their work. The framework underpinning the intent of the seed funded projects – and the Hub more broadly – is the Institute of Medicine's six quality aims[5] of safety, effectiveness, patient-centredness, timeliness, efficiency and equity of care.

In the first paper, Diane Davey and colleagues present their work *Improving patient preparation for implanted ports: a mixed methods study to establish clinical utility of a novel cancer nursing patient education resource.* Driven by evidence of lack of standardisation of nurse-led patient preparation for the insertion of an implanted port, Diane and her colleagues set out to test clinical utility of a novel, co-produced education resource, with nursing colleagues across five hospitals in Melbourne. The paper details the development of the study design, demonstrates appropriateness of mixed methods approaches to nursing practice inquiry, and offers insight to the relevance of a multi-dimensional framework of clinical utility to evaluate nursing interventions. Importantly, the paper demonstrates the potential of her initiative to deliver equitable, effective, patient-centred care.

In the paper *The TransAllo study: factors influencing attendance at and experiences of a long-term follow-up clinic post-allogeneic bone marrow transplant for patients transitioning from paediatric to adult services,* Yvonne-Panek Hudson and colleagues explore both the barriers and the enablers to smooth transition in care for patients at high risk of complex, long-term health impacts. Yvonne and her colleagues had noticed sub-optimal first-time attendance of adolescents and young adults to their adult long-term follow-up clinic. Cognisant of the potential health consequences, the team set out to better understand barriers to engagement using an interpretive descriptive approach. Yvonne's paper offers pragmatic recommendations to achieve effective, timely, patient-centred transitional pathways.

In the final paper, *Real-world experiences of nurses administering blood transfusions via a central venous access device (CVAD) concurrently with other intravenous (IV) medications for patients with malignant and non-malignant haematological conditions*, Andrea Cameron and colleagues document real-world practices and clinical decision-making of in-patient haematology nurses with regard to concurrent administration of multiple IV infusions via CVADs. Using a descriptive, exploratory study design, Andrea

and her team demonstrated variation in nursing practice within and between organisations when running concurrent and sequential IV medications and blood transfusions. Insights from the study will help inform initiatives to standardise practice, ensuring that care is safe, efficient and effective.

These papers demonstrate the importance of building nursing research capability, providing clinical nurses with the skills necessary to examine, inform and articulate the contribution of our practice at patient, organisation and system levels outcomes. Without evidence to demonstrate the impact of our work, we silence our voice.

In memory of and in gratitude for the passion, excellence and vision of Emma Cohen.

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Improving patient preparation for implanted ports: a mixed methods study to establish clinical utility of a novel cancer nursing patient education resource

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Abstract

Context Many patients with cancer require insertion of an implanted port to safely and conveniently deliver treatment. However, there is lack of standardisation of nursing preparation of patients to support understanding of and capacity to provide informed consent for a port.

Aim This study aimed to establish clinical utility of a novel, co-produced patient education resource for implanted ports to be used by cancer nurses.

Method Utilising a mixed method approach, clinical utility data were collected from five Melbourne hospitals through patient and nurse surveys and nurse interviews.

Results A total of 25 patient and 26 nurse surveys were completed; 14 nurses took part in semi-structured interviews. Clinical utility was confirmed using a multi-dimensional model for assessment of clinical utility. Communication regarding the availability and location of the resource enables or restricts use.

Conclusion This study has demonstrated utility of a novel co-produced resource to support patient-centred education about implanted ports across multiple settings.

Background

Vascular access is necessary for cancer patients receiving intravenous (IV) drug treatment such as chemotherapy, immunotherapy, hormone or targeted therapy. Treatment duration can last years, with some immunotherapy treatments continuing until disease progresses or until the patient experiences unacceptable toxicity[1]. An implanted port (port) is a small central venous access device (CVAD) that provides access to the bloodstream for IV treatment and for taking blood. Ports can improve safety and quality of life for patients receiving cancer treatment and are recommended for an increasing number of treatment protocols[2,3].

When a port is recommended, patients routinely receive education in verbal and/or written format shortly after diagnosis[4]. Port education should enable patients to decide whether to have a port implanted, facilitate informed consent, and aim to help prevent complications such as infection. However, when asked to consider a port, patients may also be trying to absorb

information about their diagnosis and treatment, impacting their ability to fully understand the rationale for and requirement for a port[2,3]. Poor understanding can result in patients proceeding without informed consent or patients delaying or refusing ports (causing treatment delays) due to fear, anxiety or decisional conflict[5]. Importantly, port patient education is not standardised and relies on the knowledge and skill of the individual nurse or health professional.

In response to this, a patient co-produced education resource was developed. The development of the resource has been reported elsewhere[6]. The aim of the study was to evaluate the clinical utility of this resource across five Melbourne hospitals. The evaluation focused on elements of clinical utility which were based on Proctor's framework for implementation outcomes[7] and the SMART guidelines for assessment of clinical utility[8] as defined in Table 1. These elements were grouped into stakeholder perception (acceptability and appropriateness), resource use (adoption, penetration, feasibility and sustainability), cost and fidelity. Barriers and enablers to using the resource were also considered.

Methods

Study design

The study used a concurrent, parallel mixed method design to evaluate the clinical utility of the resource. Qualitative and quantitative data from semi-structured interviews, surveys and field notes were collected. Qualitative and quantitative data were analysed independently then results were interpreted together.

Table 1. Elements of clinical utility

Element	Definition
Acceptability	The perceived use of the resource as satisfactory.
Appropriateness	The perceived fit of the resource to address patient education in the setting.
Adoption	The clinician's intention or action to try to or to use the resource.
Penetration	The integration of the resource within the setting.
Feasibility	The extent to which the resource can successfully be used within a setting.
Sustainability	The extent to which the use of the resource was maintained.
Cost	The implementation and process costs related to the use of the resource.
Fidelity	The degree to which the resource was used as intended by the study.

The study was conducted at five Melbourne hospitals in their day treatment settings from January–August 2020. In addition, one hospital also conducted the study in their radiology, radiotherapy, ward and clinic settings. Data collection was disrupted for approximately 10 weeks due to the COVID-19 pandemic.

The project was approved by the Peter MacCallum Cancer Centre Human Research Ethics Committee (HREC reference: LNR/59639/PMCC-2019) (Peter Mac Project No 19/225L) on 28 November 2019.

Port patient education resource

The resource is an A4 sized folder with tactile and visual features to support verbal patient education (Figure 1). It includes external and internal images depicting the location and appearance of a port from 'outside the body' and 'inside the body' perspectives. It has a detachable port and synthetic 'skin' through which the port can be felt, and a needleless 'access needle' for safe demonstration of how the port is accessed. The 'external' diagram shows the location of the port on the chest and where scars from insertion would appear. The 'internal' diagrams show the port in relation to anatomical structures, the path of the lumen, and the inner workings and function of the port.

Port education resource training

Each site received a 20-minute in-service training session delivered either by the chief principal investigator (CPI) or the site principal investigator (PI). Sessions included an overview of the study, a demonstration of the resource, instructions for use of the resource and instructions for the patient surveys. A brief one-page, laminated summary of the training was kept in the resource's information pocket. The sessions were repeated as required to accommodate larger sites and/or sites with different staff working on different days.

Participants

Participants comprised nurses working at the participating sites and patients anticipating or about to have a port implanted. Convenience sampling based on availability and willingness to participate during the data collection period applied to patients

Figure 1. Port patient education resource, multiple views

and nurses. Patient participation criteria included being 18 years of age or older and able to complete the survey in English. Eligibility criteria for nurses included being responsible for providing patient education on implanted ports.

Data collection

Nurse survey

A study-specific nurse survey was developed by the study team and pilot tested by two nurses from Hospital 1. The survey comprised 24 questions, eight covering demographic information and 16 about use of the resource, which were informed by Proctor's framework for implementation outcomes[7] and the SMART guidelines for assessment of clinical utility[8]. These included support/training received, barriers and enablers to use, questions about how the resource was used, and questions about perceived utility of the resource with different people and people from different backgrounds and characteristics. Several responses used a 5-point Likert scale[9] with free text for comments. The nurse survey was available online and in print format.

Nurse interviews

Interview questions aimed to capture in-depth information about nurse use of the resource and demographic details. As surveys were anonymous, nurses interviewed may or may not have also completed the survey. Open questions focused on the use of the resource – why used/not used, who used with, topics discussed, implementation feedback and barriers to use. The interviews were audio-recorded, transcribed verbatim and de-identified.

Patient survey

A study-specific patient survey was developed by the study team and was pilot tested by three patients at Hospital 1. The patient survey comprised 23 questions, seven demographic items and 16 questions, including if the patient had a port, if they recognised the resource from pictures in the survey, if they found features of the resource helpful, if they had suggestions to improve the resource, and questions about the resource's usefulness. Several responses used a 4-point Likert scale[9] with free text for comments. The patient survey was available in hard copy only.

Field notes

Field notes were recorded by the CPI to capture day-to-day communication with PIs/site leads. Field notes included emails and handwritten notes in a paper notebook.

Procedure

Nurse surveys

Following the introduction of the resource, invitations to complete the nurse survey were emailed to nurses by their site lead. Hard copy surveys were offered at team meetings/huddles. Periodic reminders to compete the survey were emailed. Consent was implied by submission of the survey. All responses were anonymous.

Nurse interviews

Site leads invited nurses to take part in a one-to-one semi-structured interview via email and in-person. The recruitment target was a convenience sample of one to three nurses per site. During the last 5 weeks of data collection, the CPI followed up with prospective interviewees to agree on an interview time and place/mode (phone or face-to-face). All interviews were conducted by the CPI. Written consent was obtained prior to each interview.

Patient surveys

Patients who received port education by a nurse who used the resource during the study data collection period were invited to complete an optional survey. The survey was given to them by the nurse who provided the education after the education was given. Responses could be submitted via a survey envelope or survey box onsite until the end of the data collection period specified on the survey. Consent was implied by submission of survey, and responses were anonymous.

Data analysis

In keeping with the concurrent, parallel mixed methods approach, quantitative and qualitative data from survey, interview and field note data were analysed separately and then a second stage of analysis was undertaken to compare, contrast and combine findings[10].

Quantitative data

Descriptive statistics (counts/percentages, means/standard deviations or medians, as appropriate) were used to summarise information about participant characteristics and resource use.

Qualitative data

Qualitative, semi-structured interview data were analysed using interpretive description[9]. Interpretive description is a methodology for addressing applied clinical questions through identification of themes while also taking variations between individuals into account[11]. Transcribed data were sorted into codes, then patterns and themes were formed to respond to the aim of determining clinical utility. Analysis was conducted using NVivo.

Findings

Site participation

Nurse surveys were collected from two sites, patient surveys were collected from three sites, and nurses from four sites were interviewed (Figure 2). The COVID-19 pandemic affected the study at all sites, impacting communications, staffing and port insertions. Site leads stated these impacts resulted in fewer (or nil) surveys being collected. Additional site information is included in Table 2.

Participants

Nurse survey

A total of 26 (9%) of a potential of 274 nurses, from across the five sites, completed the survey. Of these, 13 completed the

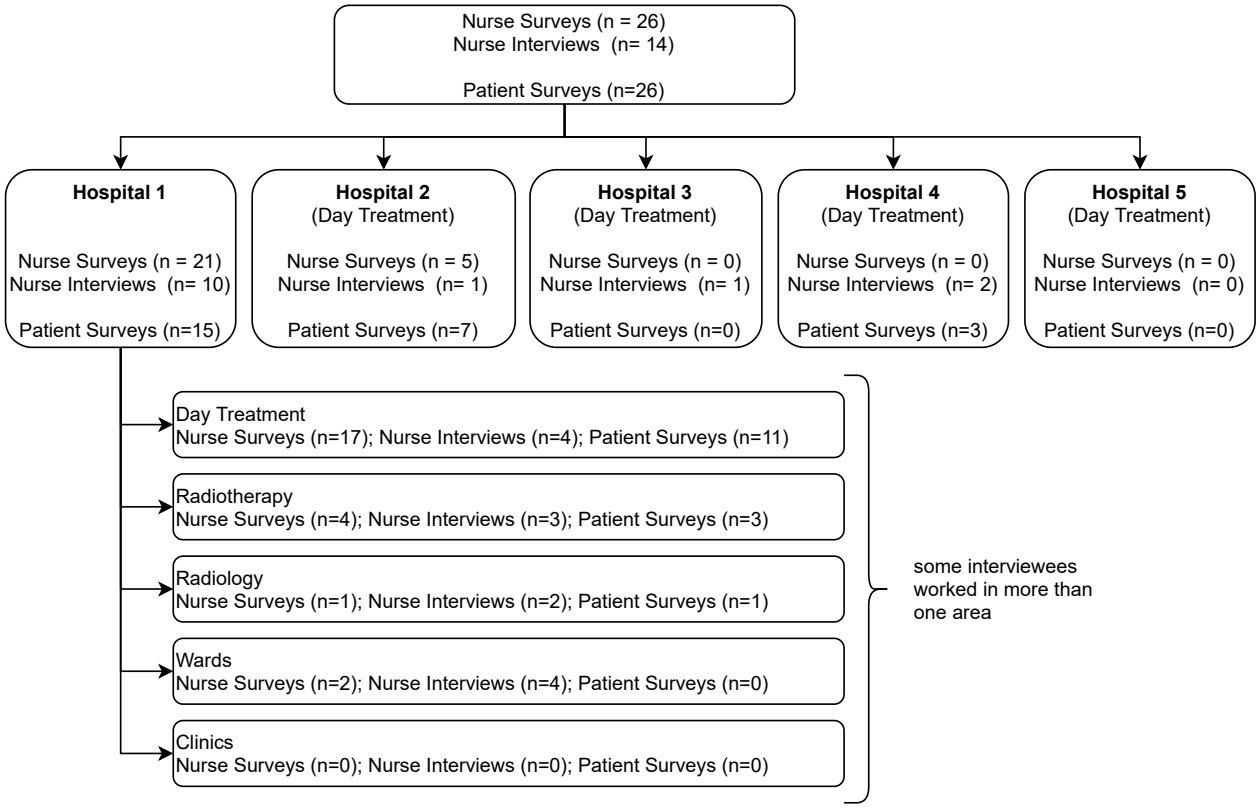

Figure 2. Consort diagram

Table 2. Site information

	No. nursing staff members	No. survey responses (% nursing staff)	No. interviews (% nursing staff)	Average no. patients seen in department per day who may require port education	Estimated proportion of patients with implanted ports	No. patient surveys completed
Hospital 1 (day treatment)	81	17 (21%)	4 (5%)	140–150	30%	11
Hospital 1 (radiotherapy)	14	4 (29%)	3 (21%)	Not available	Not available	3
Hospital 1 (radiology)	18	1 (6%)	2 (11%)	Not available	Not available	1
Hospital 1 (ward)	69	2 (3%)	4 (6%)	Not available	Not available	0
Hospital 1 (clinics)	10–30	0	0	Not available	Not available	0
Hospital 2 (day treatment)	18	5 (28%)	1 (6%)	70	20%	7
Hospital 3 (day treatment)	11	0	1 (10%)	50	1%	0
Hospital 4 (day treatment)	17	0	2 (12%)	55	30–40%	3
Hospital 5 (day treatment)	12	0	0	20–25	10–20%	0

survey online and 13 in paper form. Participant characteristics are described in Table 3.

Nurse interviews

A total of 14 nurses from four sites participated in an interview. Ten interviews were conducted face-to-face and four over the phone. Participant characteristics are described in Table 4.

Patient survey

A total of 25 patients completed a survey. Data on the number of patients approached was not collected due to the additional burden this would have placed on busy clinical nurses. Participant characteristics are described in Table 5.

Clinical utility

Stakeholder perception – acceptability and appropriateness

The resource was considered acceptable and appropriate by patients and nurses. When asked if the resource could help nurses explain what a port is and how it works, all nurses responded 'yes'. Most nurses (n=24, 92%) agreed or strongly agreed that, overall, the resource supports patients' understanding of ports:

> *I think it's easy to use and the visual was the best thing 'cause it's clear as a bell – this is what it is, this is what it looks like and this is what it feels like* – Nurse Unit Manager, Hospital 2.

When asked if the resource helped them understand what a port is and how it works, all patients responded 'yes'; all stated that the visual features helped them understand and (n=23) 96% reported that the tactile features helped them understand:

> *The detail with the skin and then the real life port, to be able to see/touch for myself helped me to understand. I loved how simple it all was too, definitely helped* – Patient, Hospital 1.

Table 3. Characteristics of nurse survey participants (n=26)

	n	%
Age (years)	Mean=35	Range=26–64
Gender		
Male	4	17%
Female	18	75%
Prefer not to disclose	2	8%
Site		
Hospital 1	21	81%
Hospital 2	5	19%
Role		
Registered nurse	18	69%
Clinical nurse specialist	5	19%
Clinical nurse educator	3	12%
Nursing experience		
0–2 years	1	4%
2.1–5 years	5	19%
5.1–10 years	10	38%
10.1–20 years	8	31%
More than 20 years	2	8%
Employment		
Full time	9	35%
Part time	15	58%
How often provide port patient education		
Weekly	10	40%
Monthly	14	56%
Yearly	1	4%
Formal education		
Undergraduate	0	
Postgraduate certificate	5	31%
Postgraduate diploma	4	25%
Masters	7	44%

Table 4. Characteristics of nurse interview participants (n=14)

	n	%
Age (years)	Mean=39	Range=27–54
Gender		
Male	7	50%
Female	7	50%
Site		
Hospital 1	10	71%
Hospital 2	1	7%
Hospital 3	1	7%
Hospital 4	2	14%
Role (note: two participants had dual roles)		
Registered nurse	2	13%
Clinical nurse specialist	5	31%
Practice development nurse	1	6%
Clinical nurse educator	1	6%
Clinical nurse consultant	3	19%
Nurse unit manager	3	19%
Acting nurse unit manager	1	6%
Nursing experience		
2.1–5 years	3	23%
5.1–10 years	3	23%
10.1–20 years	5	38%
More than 20 years	2	15%
Employment		
Full time	8	57%
Part time	5	33%
Casual	1	7%
Formal education		
Undergraduate	1	7%
Postgraduate certificate	3	21%
Postgraduate diploma	4	29%
Masters	5	36%
PhD candidate	1	7%

The simplicity and ease of use of the resource was a recurring theme in both the survey and interview data. Nurses commented on how its small, compact format and visual and tactile features made it more appropriate than other options, for example 'chesty chest' (a life-size chest model with detachable skin), a loose port, or text-heavy information handouts:

> *Once people use it they've got to realise how valuable it is 'cause it's really useful, it really helps, and it really fills a gap in my mind, there's always that kind of like OK I want to explain to you about a port, how do I explain it in this kind of... in this sort of floor environment* – Registered Nurse, Hospital 1.

Table 5. Characteristics of patient survey participants (n=25)

	n	%
Age (years)	Mean=57	Range=20–82
Gender		
Male	7	29%
Female	17	71%
Country of birth		
Australia	13	54%
Other	11	46%
First language		
English	17	71%
Other	7	29%
Residential location		
Major city	16	67%
Inner regional	6	25%
Outer regional	2	8%
Marital status		
Married/de facto	17	77%
Separated/divorced	3	14%
Widowed	2	9%
Highest level of education		
Secondary schooling	9	39%
Trade/TAFE college	4	17%
Tertiary schooling	10	43%

When patients were asked if they thought the resource could help people decide whether or not to go ahead with having an implanted port, 92% (n=22) said 'yes'. Nurses interviewed described how some patients experience fear and anxiety about implanted ports at different points and for different reasons, including port implantation decision-making, managing access difficulties and occlusions, and preventing infection. Nurses and patients in our study felt that the resource could reduce some of this fear and anxiety:

> *Taken fear out of not knowing. Less scary. Helped visualise* – Patient, Hospital 4.

The nurse survey also found that a high proportion of nurses 'agreed' or 'strongly agreed' that the resource could help people with low health literacy and people from culturally and linguistically diverse backgrounds better understand ports 73% (n=19) and 92% (n=24) respectively.

Resource use (adoption, penetration, feasibility and sustainability)

The vast majority nurses stated they intended to use the resource with both family/friends/carers of patients and directly with patients (96%, n=25). When asked how often they actually used the resource during the study period, 89% (n=23) stated they used it at least "some of the time". In Table 6, data are reported to demonstrate how nurses described they would use the resource.

Interviews revealed that the resource had been used by a range of nurses. One interviewee spoke of graduate nurses using it to educate patients:

> *Our graduate nurses have actually brought it out and they've spoken to me and they said that, you know, we've actually used this for patients and found it very easy to actually demonstrate to someone what it is* – Clinical Nurse Educator, Hospital 1.

The perception that minimal training was required for nurses familiar with ports to be able to use the resource spoke to its

Table 6. Nurse survey, topics question

Which topics did you / would you use in the tool to help explain?	
What a port is / how it works	88% did use
	96% would use
Having a port inserted	81% did use
	96% would use
Having a port accessed	88% did use
	100% would use
Having a port removed	46% did use
	65% would use
Issues / troubleshooting	35% did use
	65% would use

sustainability. Interview, survey data and field notes indicated that even nurses who had not attended in-service training prior to the implementation of the resource were using it with their patients.

Costs

For the purpose of the study, cost was calculated as nurses' time in implementation and use of the resource. Estimated unit cost, including sample port is $550. Training time was undertaken during allocated in-service training time. The main time impact reported by nurses was seeking out the resource which was impacted by communication issues at a few sites. Nurses did not provide data on whether the resource impacted the amount of time required to deliver education.

Fidelity

The study demonstrated fidelity in that the resource was used as intended, to provide patient education for ports in different clinical settings. In addition to its intended use with patients, nurses identified the opportunity for the resource to be used to educate nurses. Field notes identified that whilst delivering in-service training or demonstrating the resource to nurses, nurses were observed having 'moments of realisation' as their understanding of ports was enhanced:

> *When you first presented the Tool to us there was a few things that were like oh that's how that bit works, you know, and we're the ones that are supposed to be educating people, and it really does help, like that way of learning is really sort of effective, I think* – Registered Nurse, Hospital 1.

Enablers and barriers to use

Nurses acknowledged that, in surveys, interviews and field notes, implanted ports can be difficult to explain and that the visual and tactile features of the resources supported delivery of patient education:

> *The visual and tactile features of the Tool make explanation really easy and intuitive – it's much simpler to show by example than to explain sometimes* – Registered Nurse, (survey data) Hospital 1.

Nurse managers at each of the sites were engaged and interested in participating in the study. In-service training sessions were well attended at all sites, with nurses appearing engaged with the resource (as demonstrated by interest in handling the resource and asking questions). All participating nurses acknowledged their role as patient educators, responsible for providing port patient education.

Whilst most nurses and patients found the resource helped in reducing fear and anxiety for patients, when asked in the nurses' survey what prevented them from using the resource to educate patients, 27% of nurses commented about patients being overwhelmed:

> *Some patients find it overwhelming* – Registered Nurse, (survey data) Hospital 1.

Reported barriers to use did not relate to the physical resource itself but rather communication and operational issues commonly related to implementing practice change in busy clinical settings, for example a lack of communication about a change in location of the resource, or the resource being misplaced or not returned to its assigned location. The challenge of getting messages through to nurses about the resource was further complicated by an unprecedented volume of messages in the clinical setting relating to COVID-19, and in some sites by the launch of an electronic medical records system. Field notes revealed that operational and process issues including staff turnover, role changes, changes in practice affecting processes, and lack of processes negatively impacted use of the resource.

Deficits in some nurses' knowledge about ports was raised by clinical nurse consultants and nurse educators as a potential barrier to use. However, it was recognised that nurses responsible for providing education to patients and for accessing ports should first have a solid understanding of the concepts they are explaining, and that the resource could help with this.

Discussion

Clinical utility is defined as the usefulness of something in the clinical setting[8] and is critical to successful implementation, particularly in busy clinical environments where nurses are time poor. The findings of this study were that, overall, the resource had clinical utility in different settings and scenarios with respect to acceptability, appropriateness, adoption, penetration, feasibility, sustainability, cost and fidelity. It was successfully used in a range of settings, with a range of audiences, and to provide education on a range of port-related topics to different audiences by nurses with different levels of experience and qualifications.

Patients often have unmet information needs regarding implanted ports, and evidence suggests that most patients would like to receive more information, particularly prior to the insertion of their port[2]. Literature on patient education for CVAD describes a lack of standardised or consistent approach to providing patient education[12]. This resource therefore has potential to standardise patient education about implanted ports, contributing to improving clinical outcomes[13].

As educators, nurses are expected to understand a multitude of devices, how they are implanted, and how they function. Nurses acknowledged that the concept of a port can be a difficult one to grasp for their patients, but also for them. A recent scoping review examining the current state of nurses' knowledge around routine care and maintenance of CVAD described the situation as "alarming" and cause for global healthcare concern[14]. The opportunity to use the resource to train nurses on ports was raised by several participants. Improving how we train nurses is essential to our ability to educate patients. The resource could be used to support workplace training and deliver improvements to educational preparation of nurses.

Limitations

The study was undertaken during the COVID-19 pandemic which impacted communication and work practices, limiting the use of the resource and impacting the number of surveys collected; subsequently, a large proportion of the data was generated from only one site. Further, data regarding the resource's effectiveness in providing education was subjective as patients provided this information via self-report rather than a quantitative test.

Conclusion

For many patients, having a port can improve their experience of receiving cancer treatment. However, ports can be a difficult concept to understand, and to explain. The study demonstrated clinical utility of the resource, indicating that nurses found it acceptable and appropriate for educating patients. The time associated with using the tool and its implementation into day-to-day practice was minimal. The implementation saw the resource exceeding its intended use as it supported nurse education in addition to patient education. The resource's ease of use and perceived utility encouraged its use, whereas communication and process issues such as staff not being aware of the resource or not being able to find it, were barriers to its use. Further research is needed to test the effectiveness of the resource in educating patients about ports and to assess the effectiveness of the resource at supporting nurses in the delivery of port education to patients.

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Conflict of interest

No conflict of interest to declare.

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The TransAllo study: factors influencing attendance at and experiences of a long-term follow-up clinic post-allogeneic bone marrow transplant for patients transitioning from paediatric to adult services

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Abstract

Objective The TransAllo study aimed to explore and describe experiences of adolescent and young adult patients transitioning from paediatric to adult long-term follow-up (LTFU) services and identify common barriers and facilitators to first attendance at adult LTFU services.

Methods We used an interpretive–descriptive (ID) approach to describe and understand the experiences across four cohorts of participants who had all undergone an allogeneic bone marrow transplant as a child.

Results A total of 13 participants were involved in semi-structured telephone interviews. Six key themes were identified: critical importance of support; attendance as a high priority; importance of communication and education/knowledge; emotions and the transition experience; experience of attending LTFU and transition from paediatric to adult LTFU service; and the importance of intentionally preparing for transition.

Conclusions We recommend future research to co-design a transition program building on the insights gained from the TransAllo study.

Introduction

Approximately 600–700 allogeneic bone marrow transplants (AlloBMT) are performed in Australia each year[1]. Of these, approximately 15% are in children[1]. In Victoria, these transplants are undertaken at the Royal Children's Hospital (RCH) which is the only dedicated paediatric AlloBMT centre in the state. In 2014, the nurse-led AlloBMT long-term follow-up (LTFU) service was set up as a single service across the Royal Melbourne Hospital (RMH) and Peter MacCallum Cancer Centre (Peter Mac) in Melbourne to provide care for survivors of AlloBMT. From 2014–

2019, 56 young adults were referred to the adult LTFU service. Today, the service provides annual review for approximately 500 adult patients, including an increasing number of young adults who have transitioned from paediatric care. This number is anticipated to grow given the increasing number of long-term AlloBMT survivors[2].

Two years post-transplant, adult survivors of AlloBMT are referred to the LTFU service for survivorship care. LTFU includes screening, monitoring and management of physical and psycho-social late effects. Emerging evidence suggests that paediatric survivors of AlloBMT experience considerable unmet needs that result in morbidity and mortality such as cardiovascular, endocrine and metabolic dysfunction, and secondary malignancies[3,4]. As such, attendance for LTFU surveillance is critical to health outcomes. In 2019 we explored data from the nurse-led adult LTFU service for paediatric patients transitioning to adult LTFU. During this review we identified that some patients do not attend initial or subsequent invitations to attend adult LTFU consultations.

In response to this, we wanted to understand why adolescents and young adults transitioning from paediatric to adult LTFU services either did not attend or decided not to continue to attend this service. Therefore, the primary aim of the TransAllo study was to explore and describe experience of adolescents and young adults transitioning from paediatric to adult LTFU services among four cohorts of adolescents and young adults (18 years or older). The secondary aim was to identify common barriers and facilitators to first attendance to inform future development of a consumer and clinician toolkit to support effective transition from paediatric to adult AlloBMT LTFU services.

Methods

Study design

We used an interpretive–descriptive (ID) approach[5] to address the study aims. This is an inductive, analytic approach proposed by Thorne et al.[5] as a discipline appropriate way for nurses to explore and generate applied understanding about clinical phenomenon[6]. A detailed explanation of ID is beyond the scope of this paper, but its key philosophical underpinnings acknowledge that a person's experience of health or ill health is complex, contextual, constructed and subjective, but that there are also shared realities among people who experience similar "objective" events, such as experience of presentation at an AlloBMT LTFU service. ID assumes that the researcher approaches their study with no a-priori theory, and takes a ground-up approach to analysis to inform clinical understandings[6].

Participants and recruitment

Purposive sampling was used to recruit a maximum of 20 adolescents and young adults referred to the adult AlloBMT LTFU service across four cohorts (up to five participants per cohort). The four cohorts included participants who were:

- In paediatric LTFU at RCH preparing for transition to adult AlloBMT LTFU service, or participants who had been referred from paediatric to adult LTFU, accepted for care but not yet reviewed by the adult LTFU service.
- Referred or self-referred to the adult AlloBMT LTFU service and attended first visit.
- Referred to adult LTFU service, did not attend first visit, but attended subsequent clinic visit, or
- Referred to adult LTFU service and did not attend first or subsequent clinic visits.

Eligibility criteria included: being 18 years of age or older who had undergone an AlloBMT as a child or adolescent; having English language skills to participate in a semi-structured telephone interview; and able to provide informed consent.

Potential participants were identified from the AlloBMT LTFU database by the AlloBMT LTFU clinical nurse consultant. Eligible participants were mailed a letter of invitation and participant information sheet. Approximately 3–4 weeks after the letter of invitation was mailed out, a member of the study team contacted potential participants to determine interest and, if appropriate, schedule an interview at a convenient time and day.

Data collection

Semi-structured, audio-recorded telephone interviews were conducted by the study principal investigator (PI) using HoTAIR® conferencing. The PI (YPH) is a member of the adult AlloBMT LTFU service. To mitigate concern of any potential coercion or bias, the PI was not involved in the direct care of participants at time of recruitment or interviewing.

Field notes were taken by the PI during interviews to supplement and contextualise the discussion. Both transcripts and field notes were assigned study identification numbers to maintain confidentiality. At commencement of the interview, the study PI described the study, outlined the interview structure, asked if the participant had questions, and recorded verbal consent.

Disease and demographic data were recorded by the PI into a study-specific data collection tool. These included disease, age, type of AlloBMT, time post-AlloBMT, postcode of place of residence, employment/vocational status, transport used to get to hospital appointments, and living arrangements.

Analysis

Audio-recorded interviews were transcribed verbatim in a de-identified format and uploaded to NVivo 12[7], a program for qualitative data management. Analysis and coding were conducted by reading all transcripts to identify codes and sub codes. Codes were refined to generate key themes. Quality checking was performed by a second member of the project team (TH) who co-coded 10% of transcripts to check credibility and trustworthiness of the analytical process. There were no

disagreements in the coding or identification of key themes. Field notes were referred to during analysis and included when relevant. Audio-recording failed during one interview. Detailed field notes from this interview were included in the analysis instead. The findings are presented as a complete data set rather than by cohort due to the common experiences described across the cohorts, and the small number of participants in each. Descriptive statistics (proportions, mean, range) were used to describe disease and demographic data.

Ethics approval

Ethics approval was granted by Peter MacCallum Cancer Centre (HREC: LNR/58044/PMCC-2019) to conduct the research study.

Results

A total of 28 participants were identified as eligible to take part in the study; 13 (46%) agreed to participate (Figure 1). People who chose not to take part in the study did not provide a reason for non-participation. Participant disease and demographic data are detailed in Table 1. Across the four cohorts the ages ranged from 19–44 years of age and time since transplant ranged from 3–34 years.

Analysis of the interviews resulted in generation of six key themes from across the four cohorts: critical importance of support; attendance as a high priority; importance of communication and education/knowledge; emotions and the transition experience; experience of attending LTFU and transition from paediatric to adult LTFU service; and the importance of intentionally preparing for transition.

Critical importance of support

Experience of care

The critical importance of support from carers and health providers was a key theme across participant interviews. Participants described the supportive role of carers throughout their paediatric experience mainly referring to mothers, with fathers, grandparents and uncles identified as additional support

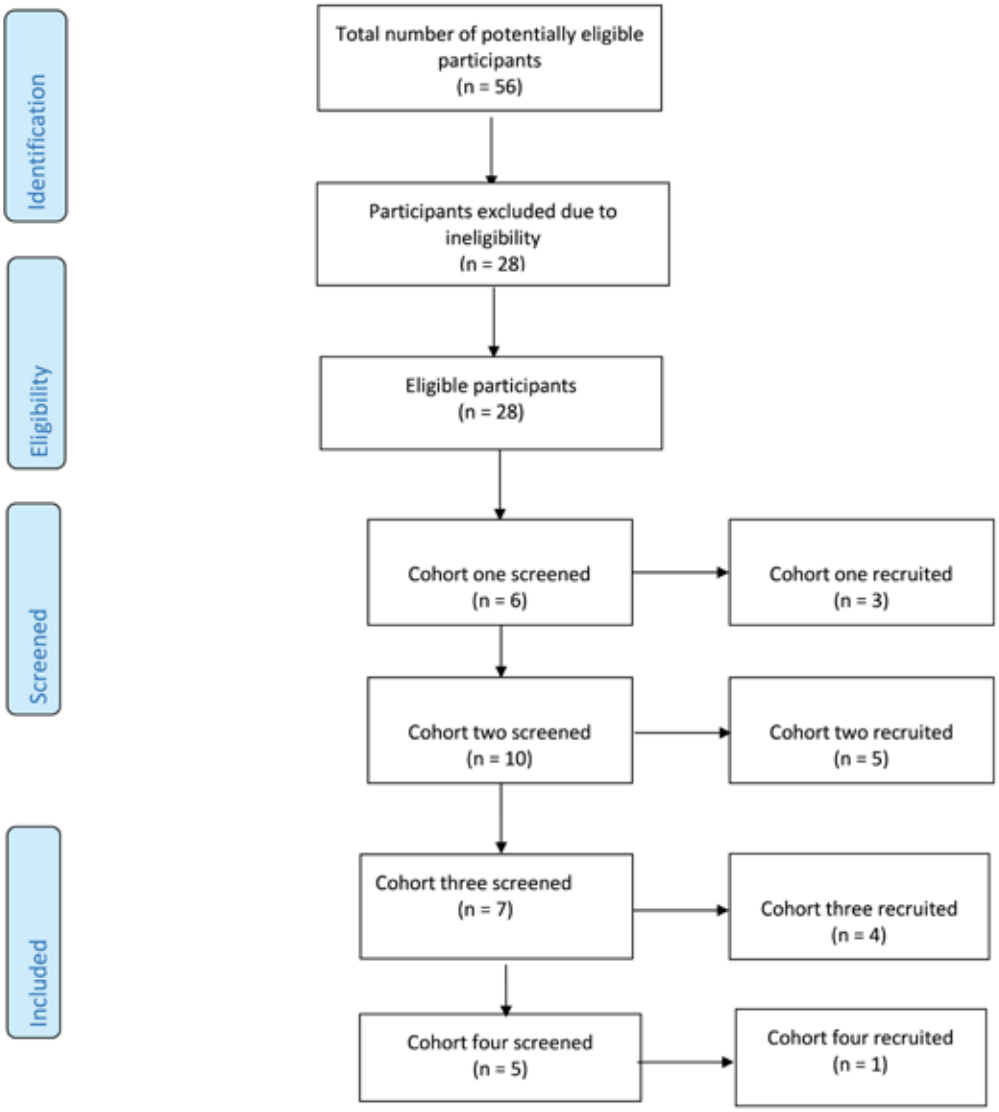

Figure 1. Recruitment schematic

people. Participants described carers as "keepers of medical information" (ID 1012), storytellers and historians, as the person who kept track of and attended appointments, and as those who helped navigate the communication and coordination of care while in the paediatric AlloBMT service:

> *She always booked all the appointments and managed the bookings and kept all that in the diary and said we're going to the hospital next week* – ID 1023.

A few participants said that they had intentional conversations with their carers about ongoing support and attendance after transitioning to adult appointments. Some participants described this transition as organic:

> *It was a very natural transition* – ID 1010.
>
> *Dad just automatically phased himself out* – ID 1012.

Participants acknowledged how difficult this must have been for their carer in terms of relinquishing their role:

> *So I think it was hard for her, they sort of didn't have any other role acutely in that space anymore* – ID 1033.

Barriers and facilitators

Participants experienced variable levels of support in transitioning from paediatric AlloBMT services:

> *I guess I didn't really have any idea who the nurse coordinator was over there* [reference to adult service] – ID 1030.

Participants described a gap in identified support while waiting for their first adult AlloBMT appointment and made strong recommendations that time to the first LTFU consultation be reduced:

> *I found a little bit of the continuity between the appointments and then the follow up to be a bit out of touch... I think that's where I became a little bit lost* – ID 1032.

Having a summarised written care plan as part of the transition process from paediatric to adult AlloBMT LTFU was identified by some participants as something that could be helpful. Preparatory documentation from the paediatric LTFU team such as discussing transition to adult AlloBMT LTFU and receiving care plans were described as positive interventions that made participants feel more confident and comfortable about transitioning:

> *It's kind of like one care plan that's got everything documented, all the doctors, all the clinicians, which is really good and really helpful* – ID 1031.

Attendance as a high priority

Barriers and facilitators

Participants described an overwhelming willingness to continue attending LTFU reviews and demonstrated knowledge of potential long-term health issues related to their diagnosis and AlloBMT:

> *There was never a sense of doubt in my mind that I was gonna go to my long term follow up appointment... I felt like I have to do it, if I do come across a medical problem, a serious one and I did have questions I wanted to be answered at that time* – ID 1020.

Building greater flexibility into the system to balance childcare, employment and study responsibilities was identified as an opportunity for greater attendance:

> *Doing shift work, you know, I get my appointments well in advance and then I can just, you know, not work on those days or whatever* – ID 1021.
>
> *Being able to have maybe a few choices just in case like one of them doesn't line up* – ID 1040.

Other recommendations for improving attendance included: reminder emails and texts; digital health platforms for clinical reviews; appointments outside of peak hour; and more choices in appointment options:

> *But telehealth they were like on time, I didn't have to worry about... catch[ing] a tram to work or... it was a lot easier* – ID 1031.

Table 1. Disease and demographic data (n=13)

Cohort	Age (mean and range)	Gender	Mean time since transplant (range)	Type of transplant
1 – Preparing for transition (n=3)	Mean: 21 years old Range: 19–24 years old	M=2, F=1	Mean: 15 years Range: 12–18 years	Cord blood transplant=1 Matched sibling donor=1 Matched unrelated donor=1
2 – Attended first appointment (n=5)	Mean: 23.6 years old Range: 19–35 years old	M=3, F=2	Mean: 10 years Range: 3–19 years	Matched sibling donor=3 Matched unrelated donor=2
3 – Did not attend first appointment but attended second (n=4)	Mean: 28.75 years old Range: 20–44 years old	M=3, F=1	Mean: 17 years Range: 4–34 years	Cord blood transplant=1 Matched sibling donor=1 Matched unrelated donor=2
4 – Has not attended at all (n=1)	23 years old	M=1	18 years	Haploidentical transplant=1

Importance of communication and education/knowledge

Experience of care

Participants generally felt overwhelmed "trying to tell a good story" (ID 1023) about their medical history and under prepared at the first adult review, suggesting "there could've been more communication between the two hospitals" (ID 1023).

Participants described needing to know more details of dates and treatment prior to first adult review, and relying on parent's memory:

> *I'm still constantly asking my mum all these questions to try and get the info [so] that I'm... I'm ready, I'm prepped* – ID 1012.

Participants described carers as being "keepers of information" (ID 1012) in paediatric AlloBMT LTFU and that the transition to adult LTFU was a shift in this dynamic.

Barriers and facilitators

The challenges of health literacy and navigating communication with the adult LTFU team and carers emerged when participants discussed their understanding and knowledge of their personal medical history and treatment in preparation for first adult LTFU review. At adult LTFU appointments, some felt a lack of information:

> *I feel like I lack a little bit of knowledge about everything like history wise of my own health* – ID 1023.

There was variability in who participants received information from about transition from paediatric to adult LTFU and in what format. Some participants felt that communication about transition is the responsibility of the multi-disciplinary team across the paediatric and adult services:

> *There's lots of little things that kind of slip through the cracks in patient education... so it's like they just kind of assume it's been done. I guess just not assuming but just asking the patient has anyone talked to you about this* – ID 1021.

Emotions and the transition experience

Experience of care

The emotional response to preparing for transition during paediatric LTFU reviews and transitioning to adult LTFU was described and discussed by participants from all four cohorts. Some participants described feeling neutral about the transition:

> *Definitely towards the end it was just like something I had to do, I didn't have too many I guess positive or negative emotions* – ID 1040.

Others described anxiety about not knowing what to expect after transition:

> *I was definitely nervous, you know... because I was leaving the paediatric setting and going into this brave new world...* – ID 1033.

There was a sense of sadness of leaving paediatric services and staff from some participants:

> *So I was quite sad actually to leave it all behind really, you know, which is a bit weird considering, you know, a lot of the times there weren't very nice, but I was really sad to leave* – ID 1023.
>
> *I just was so used to being babied along the way and then suddenly... I had to feel like an adult now, and I had to grow up* – ID 1012.

Some participants described feeling as if they had "outgrown the children's hospital" (ID 1023) but on transition to adult LTFU experienced feeling too young to be part of an adult service:

> *I felt really young and there was a lot of elderly people and middle-aged people so I was kind of stuck in the middle but it was OK* – ID 1024.

Most participants acknowledged they could not stay in paediatric LTFU forever, but there were conflicting emotions where some participants described feeling too young to transition, while others felt like they had outgrown paediatric LTFU, such as:

> ... [being the] *only one in the waiting room with their own car keys* – ID 1023.

For some, the transition brought feelings of discomfort about what they did or did not disclose to carers:

> *Even now... what information I provide to my mum and what I don't, like I'm not always completely honest with her* – ID 1032.

Experience of attending LTFU and transition from paediatric to adult LTFU service

Experience of care

Participants described their experience of first or subsequent attendance at adult LTFU review:

> *It all just sort of naturally happened where my mother sort of stepped back a bit and let me take the reins knowing very well that I was up to it...* – ID 1033.
>
> ... [it's a] *stage of survivorship and, you know... it's really multifaceted like the way it affects you, but I just had no idea and I was just kind of not really sure how to get on with things I guess* – ID 1021.

For some participants, there was excitement around building new relationships with a new healthcare team:

> *So I've had my first one earlier during the year and I really liked it...* – ID 1031.

Others experienced anxiety about the unknown, feeling as though they needed to "walk on eggshells" (ID 1021), or feeling like they "got lost in the system there for a while" (ID 1032). There was also confusion around roles in the adult sector:

> *I guess I didn't really have any idea of like who the nurse coordinator was over there so it was almost just like I had just been passed off* – ID 1030.

Participants all acknowledged the importance of attending adult LTFU as part of their growing independence and autonomy,

despite the adjustment experience, and were clear in their understanding of the onus being on them:

> *When I became independent moving away from home I wanted to become independent in all aspects of what I had to do* – ID 1012.

The importance of intentionally preparing for transition

Barriers and facilitators

Participants discussed preparedness for transition both in terms of personal readiness and knowledge needs. Knowledge gaps were frequently identified that impacted confidence and feelings of capability to take responsibility for managing LTFU:

> *So I think that would've been a really big help in knowing your journey before you transition, 'cos it is really hard when you get there* – ID 1023.

> *Definitely a knowledge gap in me, so I'm relying on my mum's memory for, you know, most of the information that I have* – ID 1032.

A few participants described the paediatric medical history not being available at their first adult LTFU review. Other participants described receiving pamphlets and resources to transition that contributed to preparedness and one participant described talking to someone who had transitioned to adult LTFU as helpful. Practising autonomous healthcare was also seen as valuable prior to transitioning:

> *I think it helped that I had started going to appointments by myself before I did transition to a different hospital* – ID 1023.

Conversely, some participants described not feeling personally prepared for transition to adult LTFU, voicing a need to be more involved in the lead-up to transition from paediatric LTFU, while some felt that their carers might have been aware of the plan for transition earlier than they did. Participants who had sessions with a paediatric transition team found this highly valuable for preparation.

Some participants described a strong need for medical information in verbal and written form, including information about the risks of late effects and the purpose of LTFU to feel prepared for their first adult review:

> *I mean, really important is that kind of communication around what exactly the treatments that I had, the side effects of the treatment, those types of things. Also an explanation around why I'm in long term care and long term follow up* – ID 1031.

Participants made specific recommendations to improve preparedness for future adolescents and young adults transitioning to adult LTFU, including earlier contact with the adult AlloBMT LTFU team, and providing information about who to contact with questions:

> *I hope for the future that there would be that better system that would allow people just to transition and there'd be a little bit more of a personal approach to it rather than, you know, here's a referral, go to this doctor, start again sort of thing* – ID 1032.

Discussion

The TransAllo study has elicited rich experiential data that can be used to develop initiatives to better prepare adolescents and young adults transitioning from paediatric to adult LTFU services post-AlloBMT. Participants discussed the support they received from their carers (frequently their mothers) and their paediatric and transition healthcare team, and how the changing nature of this support is influenced by the need for independence and self-management in the adult AlloBMT LTFU environment. Signorelli et al.[8] advocated for models of survivorship care in this population that deliver education and self-management strategies to improve health behaviours and use of healthcare. Insights from the TransAllo study support these findings. Understanding clinical and support roles across the paediatric and adult services was also identified by participants as important, findings previously reported by Sattoe et al.[9] who identified the importance of building a trusting relationship with an adult provider as criteria for successful transition.

In a recent Australian study of 27 participants attending a nurse-led survivorship program, it was reported that perceived need for survivorship care was low, affecting motivation or intent to access care[8]. However, for participants in the TransAllo study, considerable awareness of the importance of attending was evident, and there was a focus on managing potential and emerging health concerns via LTFU attendance (survivorship care). However, participants in the TransAllo study identified practical issues and competing demands as key barriers that prevented them from attending LTFU. These findings reflect the recent research by Signorelli et al.[8] who reported distance to clinic as a reason for disengagement. This has important service implications when developing future guidelines to support transition. The use of innovative models of LTFU care delivery, including primary health shared care and telemedicine, may provide one solution to address this issue.

Themes of preparedness for transition and knowledge of health history were discussed as important inter-related issues. TransAllo study participants strongly advocated for earlier preparation for transition, particularly in shifting responsibility from carer to adolescent or young adult with regard to scheduling of appointments and conversations about medical history and healthcare plans. Importantly, Sattoe et al.[9] identified poor preparation as a factor in non-attendance and propose an intervention where adult and paediatric healthcare providers collaborate in transition clinics. This model was also positively identified by some participants of the TransAllo study.

Similar to findings reported by Carney et al.[10] in a meta-synthesis of experiences of survivors of childhood cancer, participants in

our study described a desire for independence and graduation to adulthood. However, alongside this, they also acknowledged and described concern for the emotional impact on their carers of relinquishing responsibility, knowledge and control. They described emotions such as sadness relating to transitioning from a healthcare team they had built a relationship with for many years, and reservation or concern about meeting a new team in an unfamiliar environment with a different model of care delivery.

Study limitations

The TransAllo study, despite fewer numbers than anticipated across the four cohorts, described barriers and facilitators to transitioning from paediatric LTFU services and attendance at an adult LTFU service. It is one of the few studies that addresses the complexities of transitioning from paediatric to adult LTFU care from the perspectives of the person. However, this study did not describe the perspectives of carers and paediatric or adult LTFU team members. Future research exploring the views of carers and health professionals of adolescents and young adults transitioning to adult services would add further insight into this complex health experience.

Conclusion and recommendations

Adolescents and adults transitioning from paediatric LTFU services experience a series of challenging and complex events that impact their experience of and attendance at adult LTFU services. The process of transition requires awareness of and attention to a process of events for which young adults and their carers need careful preparation. These include: timely discussion of readiness for and timeliness of transition; provision of personal medical records in an accessible and meaningful format to encourage independence and confidence to present at and manage conversations at adult LTFU consultations; provision of a care plan or survivorship plan to provide a 'roadmap for the future'; early interaction with and introduction to the adult LTFU team before transition occurs; and a flexible model of care delivery that can accommodate the day to day requirements of a young adult, for example work, family or studying responsibilities.

Our study has generated new insights into the experiences of transition to adult LTFU for paediatric survivors of AlloBMT and provides pragmatic opportunities to better support adolescents and young adults transitioning to adult cancer services. We recommend future research to co-design a transition program with consumers and clinicians to build on the insights gained from the TransAllo study.

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Conflict of interest

No conflict of interest to declare.

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Cancer Nurses Society of Australia

Real-world experiences of nurses administering blood transfusions via a central venous access device (CVAD) concurrently with other intravenous (IV) medications for patients with malignant and non-malignant haematological conditions

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Abstract

Background Australian hospital policies mandate that blood transfusions and intravenous (IV) medications are not administered concurrently through the same lumen of a central venous access device (CVAD). Despite this, concurrent administration of blood transfusions and IV medications can occur on haematology wards in response to pragmatic requirements of timely administration of essential medications and supportive care therapies.

Aim To explore real-world practices and clinical decision-making of haematology nurses administrating multiple IV infusions and blood transfusions via CVAD.

Methods An exploratory, descriptive design. This research was part of a larger project; however, only qualitative data is being presented in this publication.

Results Clinical practices vary among nurses both between and within organisations when running IV medications and blood transfusions.

Conclusions This is an area of common nursing practice in need of an evidence base to standardise care and safeguard patients.

Background

Central venous access devices (CVAD) are devices that are inserted into the body through a vein to enable administration of fluids, blood products, medication and other therapies. Haematology patients typically have a double lumen CVAD inserted for the administration of complex treatment regimes, supportive care and monitoring of pathology. Patients often require continuous infusions such as total parenteral nutrition (TPN) or immunosuppressants through one dedicated lumen of the CVAD, effectively leaving one lumen for all other intravenous (IV) infusions such as blood component transfusions, antibiotics, antivirals, electrolytes, analgesics or chemotherapy. Concurrent administration of compatible IV infusions through a single lumen is necessary on haematology wards to ensure timely delivery of vital medications. Sequential (or isolated) administration is

required when incompatible or untested IV infusions are being delivered.

The administration of blood transfusions is commonplace on haematology wards and can be complicated in patients requiring multiple infusions. Blood transfusions are generally administered over 1–4 hours, depending on the haemodynamic stability of patients, and should be administered as an isolated infusion, as per hospital policies. Current guidelines of the Australian and New Zealand Society of Blood Transfusion (ANZSBT) mandate blood components should not be infused concurrently with medications through the same lumen of a CVAD (with the exception of morphine, ketamine or pethidine diluted with normal saline)[1]. However, there is recognition that further evidence is required to inform clinical practice on the safety and efficacy of co-administration of medications and blood components[1].

To date, there has been limited research into the safety of concurrent administration of IV medications and blood transfusions. The main concern documented in the literature is the risk of IV medications causing harm to the red blood cells which could result in alterations to biochemistry, haemolysis and clumping of cells consequently leading to the ineffective administration of medications and/or blood transfusion or a serious adverse event for the patient[2].

In 2009, findings from a systematic review by Murdock et al.[3] indicated that antimicrobials and low dose opioids are safe to administer concurrently with blood transfusions. However, there was insufficient evidence to inform clinical practice and guide policy change due to heterogeneity of the sample and lack of detail about the device used for administration. Over a decade later, there remains a paucity of published research that focuses on the concurrent or sequential administration of IV medications with blood transfusions. This lack of robust evidence to guide safety of concurrent and sequential administration can result in lengthy delays in either the patient receiving a blood transfusion, or a delay in the patient receiving vital IV medications. This may compromise patient safety and quality of care.

Within haematology/bone marrow transplant (BMT) units, nurses are responsible for coordination and administration of medications and blood transfusions, often managing multiple IV infusions simultaneously. This requires careful planning and coordination to ensure infusions are administered both safely and on time. The lack of an evidence-base with which to inform practice results in inconsistent, potentially harmful or ineffective practice.

Aim

The aim of this study was to explore real-world practices and clinical decision-making of in-patient haematology nurses regarding the administration of concurrent and sequential IV infusions via a CVAD for patients with haematological conditions.

Methods

An exploratory, mixed methods descriptive design was used to elicit an understanding of nursing practices and factors that influence decision-making. This publication reports on the findings from the qualitative data.

Semi-structured interviews were conducted with nurses across three participating sites who were working on haematology/BMT in-patient wards. Ethics approval was obtained at Austin Health in February 2020 (HREC/58574/Austin-2019). Nurses were recruited through email invitations by their nurse unit manager and/or approached in person or email by a member of the project team. To be eligible to take part in an interview, nurses needed to be:

- Haematology nurses who have at least 3 years clinical experience looking after haematology in-patients, and
- Currently employed on an in-patient ward of Peter MacCallum Cancer Centre (PMCC), Royal Melbourne Hospital (RMH) or Austin Health.

Data collection

Interviews took place between July 2020 and May 2021 and were conducted via face-to-face or telephone due to restrictions from the COVID-19 pandemic. All interviews were audio-recorded and transcribed verbatim. During the interviews, nurses were asked a series of open-ended questions to explore similarities and differences in organisational policies, clinical practice, IV medication administration and any impacts of concurrent or sequential blood transfusions and IV medications. Participant demographic data was also collected (e.g. age, sex, number of years working with haematology patients) to enable contextual description of the participants.

Analysis

Transcribed interview data was managed by NVivo 12[4] with a descriptive approach used to analyse and report patterns (themes)[5]. This utilises a six-phase process for identifying, analysing and reporting qualitative data using thematic analysis. This approach enabled key and dominant themes about nurses' experiences and clinical decision-making when administering multiple IV infusions to be identified. Independent coding took place of at least 10% of the transcripts by two members of the research team who then discussed coding patterns and identified and examined any discrepancies.

Results

A total of 19 nurses were interviewed at participating sites. Interviews lasted for an average of 9 minutes and ranged from 6–19 minutes.

Participant demographics

Participant demographics are presented in Table 1. To protect participants' identities and privacy, potentially identifying demographics are not presented (for example, participants' job titles) due to the small and specialised cohort.

Themes

Analysis of the qualitative data generated three overarching themes with nine sub-themes (Figure 1). Although presented as discrete themes, there was overlap and intersection across each of the areas. The key themes were:

- The clinical decisions we make as nurses.
- Plan for the expected and prepare for the unexpected.
- Complexities of haematology patient care.

Theme 1: The clinical decisions we make as nurses

All the nurses interviewed, with one exception, were aware that running blood transfusions and medications concurrently was against hospital policy recommendations:

> *At the hospital I'm currently working at, their hospital policy does not allow for blood products or advises that blood products... not be run concurrently with anything else* – Nurse Participant 1.

However, some of the nurses felt that hospital policy and infusion recommendations did not take into account or reflect the haematology patient population, particularly BMT patients who require multiple and continuous IV infusions:

> *The protocol that exists in the hospital does not account for the vast amount of medications that a bone marrow transplant patient requires when they cannot swallow their tablets... The protocol that exists... says that blood products should run on an isolated line, but in the setting that we work in that's not always feasible* – Nurse Participant 15.

Table 1. Participant demographic data

Demographics	Participants (n=19, %)
Sex	
Female	19 (100%)
Age (range)	
20–29 years	11 (58%)
30–39 years	7 (37%)
40–49 years	1 (5%)
Years of experience as a haematology nurse	Mean: 7 years Range: 3–18 years

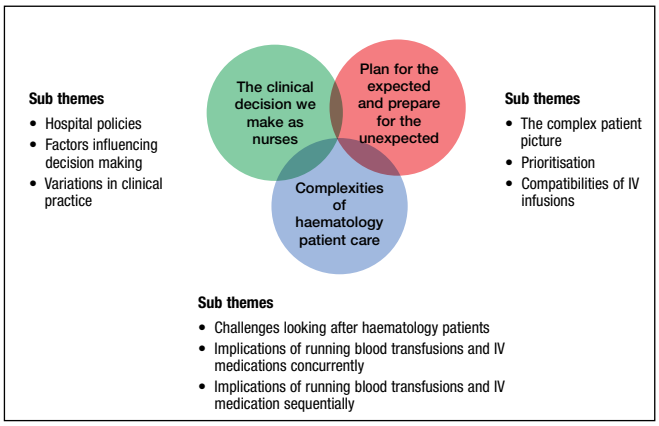

Figure 1. Themes from nurse interviews

Yet, nurses reported there was variation in practice, with some nurses saying that they would not run blood transfusions and IV medications concurrently under any circumstances. One nurse stated she had, on one occasion, administered a blood transfusion and IV medications concurrently out of necessity and there was not any other option, as the patient had a CVAD as well as two peripheral IV cannulas (IVC), all with continuous IV infusions running that were incompatible:

> *The only instance... ever... was when we had... two cannulas in because there were two PCAs [patient-controlled analgesia] running where they were both not compatible and then they had... Tacro[limus] 24 hourly and TPN* – Nurse Participant 8.

Two nurses stated they would only run IV PCA or a ketamine infusion concurrently with a blood transfusion if the patient had a continuous infusion such as TPN running through the other lumen. They would avoid concurrently administering other medications with blood transfusion due to a lack of clinical experience informing their practice:

> *I haven't really got any experience with running antibiotics or anything... with blood products... But definitely with a PCA or a ketamine infusion I have left the... normal saline line running with the PCA as well as running the blood transfusion* – Nurse Participant 1.

Some nurses explained that they would run blood transfusions and medications as isolated/sequential infusions, if possible, but because of the patient cohort and the multiple IV infusions required this was not always possible. These nurses would run the infusions concurrently if they deemed this appropriate and safe:

> *If we can run... isolated blood products where possible that is obviously the ideal situation... But we often have situations where they're bone marrow transplant patients which they have their other lumen already having a drug that also needs to be isolated so this makes it very tricky. So we do run into a situation where we often have to compromise and do run certain drugs and blood products together via the one lumen to keep say another drug isolated and safe for the patient* – Nurse Participant 14.

> *If you can get away with not having... blood products... and electrolytes and antibiotics at the same time, fine. But if you have to because there's a clinical indication then I think you need to make a judgement call around that* – Nurse Participant 5.

Decision-making was multi-factorial and based largely on the individual nurse's clinical experience caring for haematological patients, the support and guidance they received throughout their career, the current culture on the wards on which they work and the current patient clinical picture:

I don't think it is a written policy anywhere but it is definitely the way I was taught and... the way I've taught people [running IV medications concurrently with blood transfusions] – Nurse Participant 14.

I probably learnt that from other hospitals that I have worked in because it's always been policy to run [blood transfusions and IV medications together]... I suppose when you learn and you're working with other nurses and things like that and kind of you're guided by their practice as well – Nurse Participant 3.

Nurses' decision-making was also based on their real-world experiences and observations and those of their colleagues. If an adverse event occurred when blood transfusions and IV medications were transfused concurrently, it was shared between colleagues so similar future adverse events could be avoided:

In the past we found that... a common denominator with PICC lines being blocked – no evidence around it but it seemed to be the most common denominator when PICCs were being blocked – was blood products with Posaconazole – Nurse Participant 11.

I wouldn't run blood with certain saline medications that have a high viscosity because it has in my experience blocked a line – Nurse Participant 15.

Nurse participants also discussed the challenges, confusion and variation of care that new and junior staff members are faced with when working on a ward with differing practices:

It'd be hard for junior staff members when you're trying to support them on the ward and you've got some people doing one thing and then the policy saying the opposite thing, so it'd be hard to support especially new staff members or junior staff members with stuff like this...' cause there's really no right answer – Nurse Participant 5.

There was an awareness with some of the nurses that there was a lack of documented evidence to support nursing practice when running IV infusions with blood transfusions:

We have clear guidelines as to what medications react with each other whereas at the moment there is no real clear guideline on what medications blood can and cannot be run with in terms of their compatibility side of things – Nurse Participant 9.

Some nurses described that although running IV medications and blood transfusions concurrently would be beneficial in delivering care, they would not change their current practice until there was documented evidence and/or changes in hospital policy as there was a potential risk to patient safety:

It would have to be done and tried and there was no risk to the patient to allow me to do that and then integrated into the policy... it would have to be trialled first – Nurse Participant 16.

Theme 2: Plan for the expected and prepare for the unexpected

The nurses identified that planning the sequence of events for a patient's care in response to their needs at the beginning of a shift was a priority, especially when caring for complex haematology patients. For example, if a patient was experiencing symptomatic anaemia, a blood transfusion would be prioritised, whereas if a patient was febrile and neutropenic or septic, administration of antibiotics would be prioritised:

Looking at the patient's current sort of issues, if they're... febrile neutropenic obviously I wouldn't delay their antibiotics for a blood transfusion or... vice versa, if they were really symptomatic with... or they were bleeding or something and needed platelets then obviously I'd give those over antibiotics – Nurse Participant 1.

However, in order to maintain the haemodynamic status of complex haematology patients, multiple IV infusions are commonly required to stabilise their condition, and it is not always clear what infusion should be prioritised:

Sometimes with our haematology patients all of those infusions are equally as important, so I think it's quite hard to kind of really prioritise which one should be first and things like that – Nurse Participant 3.

The nurses explained that, despite careful organisation, things did not always go to plan. Nurses would need to react, re-prioritise and sometimes delay a planned blood transfusion based on patient status or clinical presentation such as febrile episode:

You have a really small window to fit them in [IV infusions], and then you've got to throw in... they febrile and things like that, then it's just chaos – Nurse Participant 3.

There's things you can't prepare for, like for example someone getting a fever and all these other things, you can't prepare for those things. And typically it's not one, you don't have one patient with this issue, it's multiple patients – Nurse Participant 4.

The nurses discussed the challenges of having to administer blood transfusions outside of recommended times as stated in hospital policy in order to respond to life threatening thrombocytopenia or anaemia that necessitate intervention before other planned procedures (one hospital policy stated blood transfusions should be administered between 8am–8pm unless an emergency):

We give a lot of blood products out of hours on our ward because we're either getting people ready for procedures in the morning, so we'll give platelets before hours or we'll give blood after hours because it's only ordered in the afternoon and it's got to come from central... I don't really have a problem with giving blood products out of hours but that's not a practice that's accepted elsewhere – Nurse Participant 5.

You're essentially doing more harm than good if you're gonna delay it and give bloods... at midnight when there's less staff on, you know, more chances of errors and things – Nurse Participant 10.

Nurses interviewed demonstrated an excellent understanding of medication compatibilities and were experienced in running multiple compatible infusions through the same lumen. Nurses accessed local hospital IV policies and would also use other hospital recommended resources available to ensure infusions were administered both timely and safely:

> *You need to check the compatibility of medications, so we run a lot of things through the same lumen so you need to check that the drugs don't have the potential to interact with each other which there's a great website that tells us that* – Nurse Participant 9.

Theme 3: Complexities of the haematology patient care

Nurses spoke about the complexity of decisions they must make to balance the benefits or risks of concurrent or sequential IV medication or blood transfusion administration:

> *If we give them two bags of blood, it's maybe every second day... that these patients require blood transfusion. So to think if we were unable to run blood products with the intravenous drugs then they wouldn't get their prophylactic drugs or their treatment drugs. So really it's a question of what's more important and they're both as important as each other, you know. Therapy and also blood transfusion they're both life saving measures* – Nurse Participant 14.

When a decision is made not to administer IV medications concurrently with blood transfusions, the nurses described consequent delays in administration of medication/s for patients, often recognising that decisions made may compromise patient care:

> *People can have medications delayed which might mean if they're septic that... they're not responding as well to treatment that they otherwise would because their medications are given at delayed intervals that might make it more difficult for drug monitoring such as Vancomycin management* – Nurse Participant 5.

> *Our patients are on [multiple medications]. A lot of them are time sensitive such as antibiotics, a lot of them are continuous infusions, ones we cannot pause such as immunosuppression, TPN, a lot of them are critical, we cannot just miss a dose because we have blood running* – Nurse Participant 9.

Nurses also explained that sequential administration of antibiotics or bloods, to prevent concurrent administration, necessitates patients having peripheral IVCs inserted, increasing the risk of infection and contributing to patient distress. In addition, this patient cohort can have poor peripheral access due to the nature of their treatment, resulting in multiple attempts to cannulate, adding to risk of infection and patient discomfort. Peripheral IVCs can also impact mobility due to multiple lines attached to a patient at different sites, potentially contributing to a patient's functional decline:

> *Putting in the cannula.... And being neutropenic... that needs to be a really last resort but sometimes it is a first resort in reality of getting things through* – Nurse Participant 6.

> *Quite often it's almost impossible to cannulate those patients because of venous collapse from chemotherapy or from ongoing infection. Also because of patient preference and comfort* – Nurse Participant 15.

Nurses reported that IV analgesics (such as PCAs and ketamine) are sometimes paused for the duration of a blood transfusion when run as an isolated infusion if further IV access cannot be obtained, risking suffering and distress for patients as a result of inadequate pain management. It also means that alternative routes of analgesics may need to be prescribed which can cause further delay and suboptimal pain management:

> *I usually just try and get a stat order from the doctor for something else while the PCA's stopped, and I try and plan that like prior to commencing rather than doing it at the time when a person has pain and then it takes me an hour to... sort it out* – Nurse Participant 4.

Nurses described when they administered IV medications concurrently with blood products that they would not run a medication known to cause a reaction, or administer a medication that a patient hadn't received before, with a blood transfusion:

> *Obviously we use our rationale and clinical judgement... if it's a first time medication or if it's a high risk reaction medication then we would avoid where possible* – Nurse Participant 14.

> *If you have an antibiotic that's never been given before or a medication... you could possibly react to that, then people need to be aware that that wouldn't be sensible to run blood at the same time as that medication because you wouldn't know what they're actually reacting to* – Nurse Participant 4.

Discussion

Nurses caring for people affected by haematological malignancies commonly manage, and have responsibility for, seriously unwell and physiologically unstable patients who commonly require multiple IV infusions. In practice, organisation and timing of delivery of these infusions requires careful planning, experience and expert understanding of drug compatibilities, as well as potential and actual clinical risks for patients and detailed appreciation of the nuances and tolerability of CVAD. The complexity of managing patients who require replacement of electrolytes and/or blood products in addition to other medications creates a high-risk environment of care for both the patient and nurse. Evidence to inform and guide optimal care is essential to safeguard patients in these situations.

Limited evidence has been published about the efficacy and safety of concurrent administration of IV medications and blood transfusions, leaving nurses to rely on local policies, their colleagues' opinions and views, and their own experience and expertise to guide clinical decision-making. This leaves nurses at risk, at best, of disciplinary action should a patient experience an

adverse event because running blood transfusions concurrently with IV medications is against hospital policy and, at worst, of having to live with the consequences of a catastrophic outcome for a patient. Insights from our study demonstrate how a lack of evidence to inform practice results in variation in clinical practice, impacting quality and safety of care for patients and the nurses caring for them.

Limitations

There are limitations to consider in this research. This study recruited a small, convenience sample and drew data from three Victorian centres. Insights from nurses within other haematology services across Australia and from other complex care environments would provide valuable data around the generalisability of these findings. In addition, further understandings regarding what influences nurses' decision-making could be generated by a more targeted exploration of nurses with different levels of experience.

Recommendations

This project has highlighted the dearth of evidence to inform nursing practice when running IV medications and blood transfusions concurrently through the same lumen. Further nursing research is warranted to create additional evidence to guide and support nurses' clinical decision-making when concurrently administering IV infusions and blood transfusions. Robust case note audits are recommended to advance the evidence base for management of concurrent IV medication administration via CVAD. In addition to this, there is opportunity to undertake small scale studies to build our understanding of the nature of the problem being addressed. For example:

- A qualitative study to explore patients' experiences of pain management when PCA is paused to accommodate a blood transfusion.
- An observational study to capture nursing workflow impacts and resource use during sequential administration of blood transfusions and IV medications.

Conclusion

By exploring nursing practices across three haematology BMT wards we can begin to build an evidence base to inform nursing practice about concurrent administration of IV medications and blood transfusions via CVAD. This study provides essential evidence required to strengthen the quality and safety of nursing care for people affected by haematological malignancies:

> *Nurses are the biggest group of health professionals and due to the complexity of our role, and proximity to patients, we need to develop a greater research base that supports our practice* – Emma Cohen, 2019.

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Conflict of interest

No conflict of interest to declare.

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