

Patient participation in medication safety during an acute care admission

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Abstract

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Background Patient participation in medication management during hospitalization is thought to reduce medication errors and, following discharge, improve adherence and therapeutic use of medications. There is, however, limited understanding of how patients participate in their medication management while hospitalized.

Objective To explore patient participation in the context of medication management during a hospital admission for a cardiac surgical intervention of patients with cardiovascular disease.

Design Single institution, case study design. The unit of analysis was a cardiothoracic ward of a major metropolitan, tertiary referral hospital in Melbourne, Australia. Multiple methods of data collection were used including pre-admission and pre-discharge patient interviews ($n = 98$), naturalistic observations ($n = 48$) and focus group interviews ($n = 2$).

Results All patients had changes made to their pre-operative cardiovascular medications as a consequence of surgery. More patients were able to list and state the purpose and side-effects of their cardiovascular medications at pre-admission than prior to discharge from hospital. There was very little evidence that nurses used opportunities such as medication administration times to engage patients in medication management during hospital admission.

Discussion and Conclusions Failure to engage patients in medication management and provide opportunities for patients to learn about changes to their medications has implications for the quality and safety of care patients receive in hospital and when managing their medications once discharged. To increase the opportunity for patients to participate in medication management, a fundamental shift in the way nurses currently provide care is required.

Introduction

Within acute care settings, medication error and medication adherence are major and long-standing safety and quality problems.^{1–9} In Australia, adverse events as a consequence of medication error affect 2–3% of all patients admitted to hospital.⁵ Further, the rate of medication-related hospital admissions is reported as 20%⁴ with the majority of these admissions relating to non-adherence of patients with medication regimens once they are discharged from hospital. The problem of in-hospital medication errors and post-discharge medication adherence is not limited to the Australian context. Similar issues have been reported in other developed countries.^{6,7,10–13} Patient participation in medication management during hospitalization has been proposed as a defence against medication errors¹⁴ and as a means of improving patients' adherence to medications once discharged from hospital.¹⁵

In health care, the focus on patient participation has been predominately in the areas of treatment decisions and chronic illness management. More recently, the concept of patients as active participants in their care has been incorporated into health-care policy as an important element in achieving quality patient outcomes. Patient participation in health care has been reported to improve patient outcomes^{16–19} and is proposed to play an important role in improving the safety and quality of health care.²⁰ There is, however, limited understanding of how patients participate, or are facilitated to participate, in their management while hospitalized. In relation to medication management, indicative behaviours of patient participation are not entirely clear.

Gruman *et al.*²¹ identified indicative behaviours of active patient engagement in health care, some of which apply specifically to patient participation in medication management. These behaviours relate to patients knowing the purpose and side-effects of their medications to monitor their effectiveness, being prepared to discuss their medications with clinicians and effectively manage the

procurement, storage and continuity of medications. The Joint Commission 'Speak Up' programme is a nationwide campaign in the United States urging patients to take a role in preventing health-care errors by becoming active, involved and informed participants in the health-care team.²² This initiative also attempts to identify indicative behaviours of patient participation in medication management recommending that patients know the name and purpose of each medication they are prescribed and have the dose, route, frequency and duration of each medication documented and readily accessible. Implicit in the initiatives of both Gruman *et al.* and The Joint Commission is that patients must understand their medications to actively engage in their medication management to prevent error and improve therapeutic outcomes. The nurse–patient interface during medication administration activities represents an opportunity for assessing and assisting patients' understanding of their medication management plan.

The study reported in this paper is situated within a large, mixed-method exploration of the enactment of patient participation during episodes of acute hospitalization. The aim of this substudy was to explore patient participation in the context of medication management during a hospital admission for a cardiac surgical intervention of patients with cardiovascular disease. An acute hospital admission provides an opportunity for patients to engage with multiple clinicians in relation to their medication management plan. This opportunity is expected to enhance, through participation, patients' knowledge of their medications, incorporating changes to their medication regimen after surgery. The specific research questions were:

1. Does patients' ability to provide a complete list and state the purpose and side-effects of their current cardiovascular medications change as a function of a surgical admission?
2. How do nurses facilitate patient participation in medication management?

Methods

For this exploratory, descriptive study, a mixed-method approach was used in a single institution, case study design. The setting was the cardiothoracic ward of a major metropolitan, tertiary referral hospital in Melbourne, Australia. Multiple methods of data collection were used. Structured patient interviews, before surgery and prior to discharge from hospital, provided data regarding patients' knowledge of their cardiovascular medications. Naturalistic observations based on the tenets of qualitative exploratory descriptive research were used to elicit the clinical practices surrounding medication management. Some time was spent by the researcher in the ward prior to the observations to promote familiarity with ward personnel and decrease awareness of staff in an attempt to minimize a potential Hawthorne effect. A premise of this exploration was that informing patients about new medications and reinforcing their knowledge of existing medications is a part of routine medication management. Focus group interviews explored nurses' perceptions of how they facilitate patient participation in medication management and supported the data derived from the naturalistic observations. The study was approved by the human research and ethics committees of the hospital and affiliated university.

Participants

A total of 130 patients scheduled to undergo cardiac surgery who presented to the pre-admission clinic we recruited to participate in the study between April and December 2008. Of these, 98 patients went on to have surgery during the data collection period between April 2008 and April 2009. A subset of 48 patients were recruited sequentially using stratified, purposive sampling according to age (≥ 65 years and < 65 years) and sex for the observation component of the study. The inclusion criterion for patients was scheduled cardiac surgery. Patients below 18 years of age were excluded.

Nurses were chosen as the health-care profession to be involved in the study because of:

a) their role in 24-h care delivery and b) their role in frontline medication management.

Forty nurses providing direct care for patients who had consented to participate were observed in the 48 observation periods, as 10 nurses were observed more than once. Of these forty nurses, sixteen were involved in one of the two focus group interviews based on their availability to participate. All nurse participants were permanent staff on the cardiothoracic ward.

Procedure and data collection

To elicit knowledge of medications, patients were interviewed twice: during the pre-admission period and prior to discharge from hospital after their surgery. Pre-discharge interviews were conducted on the day of planned discharge. In most instances, this occurred following a review of discharge medications with the patient by a pharmacist and the dispensation of discharge medications. This was considered important as the pharmacy review prior to discharge was another opportunity for patients to receive information about their medications.

Based on the urgency for surgery, the time between patients' pre-admission appointment and surgical intervention varied and not all patients who attended the pre-admission clinic went on to have surgery in the case study ward. Consequently, 75% of patients ($n = 98$) at pre-admission were interviewed following surgery. Patients who were not interviewed had undergone surgery at another hospital ($n = 13$), were still waiting for surgery ($n = 16$) or withdrawn from surgery ($n = 3$). Repeated measures data pertaining to the 98 who went on to have surgery are reported in this paper. At pre-admission, the questions that provided structure for the interviews were:

1. What medications are you currently taking?
2. Why are you taking this medication?
3. Is there anything you need to look out for (side-effects) or be aware of when taking this medication?

At the pre-discharge interview, these three questions were asked again. Patients' cognitive status was also assessed at this time, using the Six-Item Screener²³ to identify patients' ability to retain information. The Six-Item Screener is a brief and reliable instrument that identifies cognitive impairment in participants using six items from the Mini-mental state examination (MMSE).^{23,24} For both the pre-admission and pre-discharge interviews, patients' medications were verified using reconciliation documents in their medical record. Where there were discrepancies in terms of a higher number of reported medications compared with documented medications, further verification was sought. When there were a lower number of reported medications compared with documented medications, verification was not possible without consulting the patients' general practitioners. In this case, the assumption was made that patients had missed medications.

The duration of pre-admission patient interviews ranged in length from 35 to 60 min, while the pre-discharge interviews ranged from 15 to 45 min in duration. Patients' responses were recorded verbatim and at times repeated back to patients for clarity.

Each naturalistic observation covered a 2-h period where nurse and patient interactions were recorded using a portable digital voice-recorder and transcribed verbatim.

The naturalistic observation periods were planned to coincide with handover and double staffing when discussions regarding goals of care, including medication management, would be most likely to occur.²⁵

The purpose of the first focus group interview was to explore nurses' perceptions of how they facilitate patient participation in medication management. The purpose of the second focus group interview was to confirm the major findings of the study and seek explanations for the findings from the nurses' perspectives. The two focus groups were conducted with four and twelve ward nurses, respectively, and lasted approximately 1 h. These were audio-recorded and transcribed verbatim.

Statistical and qualitative analyses

Descriptive analyses explored patients' knowledge of their medication management, where appropriate inferential statistics were used with chi-square comparisons. Content analysis was undertaken to count, cluster and describe the frequency, duration and initiators of interactions between nurses and patients in relation to medication management during the observation period. Thematic analysis based on qualitative description was used to identify themes in the observational data and nursing focus group interviews.

Results

Table 1 depicts patients' characteristics. The average age of patients was 65.2 (SD = 12.2) years, minimum age 25 years and maximum 87 years. Thirty-seven percent ($n = 36$) of patients had an education level equivalent to or greater than successful completion of high school. For the majority of patients (86%), the main language spoken at home was English. Patient characteristics for the observed and not observed patients were similar except for the sex distribution in the observed patient group due to the purposive stratification of this group by sex.

The median time between the pre-admission appointment and surgery was 61 days (Q1 = 33, Q3 = 93, Min 2, Max 130). The median length of stay was 8 days (Q1 = 7, Q3 = 14, Min 5, Max 41). Of the 98 patients who were interviewed prior to discharge, 12.2% ($n = 12$) were considered to have cognitive impairment according to the Six-Item Screener.

Patient interviews: Patients' knowledge of their medications

All patients ($n = 98$) had changes made to their pre-operative cardiovascular medications as a consequence of surgery. Prior to surgery, 90.8% of patients were prescribed medications for the treatment or prevention of a

Table 1 Characteristics ($n = 98$) of patients who did and did not participate in the naturalistic observations

Characteristic	Patients	
	Observed $n = 48$ n (%)	Not observed $n = 50$ n (%)
Sex		
Male	24 (50.0)	40 (80.0)
Female	24 (50.0)	10 (20.0)
Education level		
≥VCE*	15 (31.3)	21 (42.0)
<VCE*	33 (68.7)	29 (58.0)
Language spoken at home		
English	41 (85.4)	43 (86.0)
Non-English	7 (14.6)	7 (14.0)
Living arrangement		
Alone	22 (45.8)	16 (32.0)
With partner	26 (54.2)	34 (68.0)
Type of surgery		
Coronary artery bypass grafts	24 (50.0)	30 (60.0)
Heart valve replacement	24 (50.0)	20 (40.0)
Previous surgery		
Yes	15 (31.3)	16 (32.0)
No	33 (68.7)	34 (68.0)
	Mean (SD)	Mean (SD)
Age	65.35 (11.08)	65.60 (12.15)

*Victorian Certificate of Education. Equivalent to successful completion of high school.

cardiovascular condition. All patients (100%) were prescribed cardiovascular medications prior to discharge. The average number of cardiovascular medications prescribed were relatively constant at pre-admission 3.4 (min 0, max 8) and pre-discharge 3.7 (min 1, max 7). Pre-discharge, there was minimal difference in prescribed cardiovascular medications as a function of type of surgery except for anticoagulant medication. Following heart valve replacement surgery, the majority of patients (84%, $n = 26$) were prescribed an anticoagulant. In contrast, only five patients (16%) were prescribed anticoagulant medication following coronary artery bypass graft surgery.

Table 2 displays patients' knowledge of cardiovascular medications pre- and post-discharge and, in the case of pre-discharge

medications, according to whether prescriptions were new or pre-existing. Following surgery, patients were likely to have received new prescriptions for antiplatelet, cholesterol lowering, beta-blocker, diuretic and anticoagulant medications, whereas prescriptions for ace inhibitor, anti-angina, sartan and calcium channel blocker medications were more likely to be ceased. More patients were able to list and state the purpose and side-effects of their medications at pre-admission than prior to discharge from hospital. Knowledge of side-effects was low at pre-admission, and with three exceptions, patients could not state any side-effects pre-discharge. Of the patients who could list their medications pre-discharge, 59.6% ($n = 31$) were patients continuing with the same medication and 40.3% ($n = 21$) were patients commencing a new medication. Similarly, 57.4% ($n = 27$) of patients could state the purpose of their medications when these medications were the same as their pre-admission medications compared to 42.5% ($n = 20$) commencing a new medication.

Naturalistic observations and focus group interviews: clinicians' facilitation of patient participation in medication management

The average number of patients cared for by each nurse per shift was 3 (SD = 0.5, range 2–4). Nurse and patient interactions were observed for a total of 96 h. Most observations (90%) occurred within 48 h of a patient's transfer to the ward from the intensive care unit. The remaining observations ($n = 5$) were conducted between day 2 and day 6 of transfer. On average, nurses spent 17.4 (SD = 13) min in a patient's room. Of that time, an average of 3.8 (SD = 3.5) min was spent in nurse and patient interaction.

During the observation period, medication-related activity occurred in 29 of the 48 patients (60.4%). Medication-related activity constituted any sort of exchange between a nurse and patient about medications. For these 29 patients, 33 separate medication-related activities were observed. Twenty-nine (87.8%)

Table 2 The proportion of patients who knew their cardiovascular medications according to status of prescription (existing or new) (*n* = 98)

Cardiovascular medication	Prescribed medication			Knowledge of medication						Side-effects					
				List			Purpose			Pre-discharge			Pre-admission		
	Pre-admission <i>n</i> (%)	Pre-discharge <i>n</i> (%)		Pre-admission %	Existing <i>n</i> (%)	New <i>n</i> (%)	Pre-admission %	Existing <i>n</i> (%)	New <i>n</i> (%)	Pre-admission %	Existing <i>n</i> (%)	New <i>n</i> (%)	Pre-admission %	Existing <i>n</i> (%)	New <i>n</i> (%)
Antiplatelet	69 (70.4)	77 (78.6)		97.1	6 (7.7)	3 (3.8)	78.2	5 (6.4)	3 (3.8)	13.0	1 (1.2)	0 (0.0)			
Cholesterol lowering	67 (68.4)	69 (70.4)		98.5	9 (13.0)	0 (0.0)	67.1	8 (11.5)	0 (0.0)	4.5	0 (0.0)	0 (0.0)			
Beta-blocker	47 (47.9)	67 (68.4)		93.6	6 (8.9)	4 (5.9)	59.5	5 (7.4)	3 (4.4)	0.0	0 (0.0)	0 (0.0)			
Ace Inhibitor	41 (41.8)	40 (40.8)		97.5	3 (7.5)	0 (0.0)	48.7	3 (7.5)	0 (0.0)	0.0	0 (0.0)	0 (0.0)			
Anti-angina	36 (36.7)	5 (5.1)		91.6	1 (20.0)	0 (0.0)	61.1	1 (20.0)	0 (0.0)	16.6	0 (0.0)	0 (0.0)			
Sartan	22 (22.4)	7 (7.1)		100	2 (28.5)	0 (0.0)	72.7	1 (14.2)	0 (0.0)	4.5	0 (0.0)	0 (0.0)			
Calcium channel blocker	19 (19.4)	13 (13.2)		100	0 (0.0)	0 (0.0)	73.6	0 (0.0)	0 (0.0)	10.5	0 (0.0)	0 (0.0)			
Diuretic	18 (18.3)	52 (53.0)		88.8	2 (3.8)	2 (3.8)	50.0	2 (3.8)	2 (3.8)	11.1	0 (0.0)	0 (0.0)			
Anticoagulant	12 (12.2)	31 (31.6)		91.6	2 (6.4)	11 (35.4)	75.0	2 (6.4)	11 (35.5)	33.3	1 (3.2)	1 (3.2)			

of these activities were initiated by nursing staff and 4 (12.1%) were initiated by patients.

The naturalistic observations and the focus group interviews were designed to provide valuable contextual data to enhance understanding of patient participation in medication management. Data from these two sources, although limited, revealed a lack of engagement by nurses to involve patients in medication management. Nurses generally took a procedural, task-orientated approach to the administration of medications missing opportunities to educate and promote patients' participation. The nurses in the focus groups appeared to be disconcerted and surprised by the notion that they could do more to provide patients with meaningful information regarding their medication.

The major theme to emerge from these data identified a missing culture of care surrounding patient involvement in medication management.

Missed opportunities

Data from the observation phase were sparse highlighting the limited time nurses interacted with patients and demonstrating many lost opportunities for effectively involving patients' in their medication management. The majority of interactions confirmed that the task of administering prescribed medication was at the forefront of the nurses' interactions. Little attention was given to educating or involving patients in their medications beyond the actual name or superficial purpose of the medicine:

...I have just got some lactulose for your bowels... (nurse 6)

Here's some panadol to make you not feel too bad (nurse 9)

I'm giving your potassium and metformin (nurse 27)

The process was essentially task-focused. As seen above at times, cursory explanations of the medication's purpose were provided, but patient understanding was not examined, and there was no opportunity given for questions to be asked

or concerns to be expressed. The same process held true even for those medications that would form the on-going treatment plan for these patients once they were discharged:

I have one tablet for you. It's only a little one, but don't take it if you are still feeling nauseated (nurse 30)

Ok (patient 83, female, 68 years)

It's the fluid one, the lasix (nurse 30)

I have a small blue tablet for you. This is the one which helps the heart rate because it's still a little bit fast. Alright? (nurse 17)

Patient nods and takes tablet (patient 73, female, 79 years)

This is a small dose of the beta blocker that you were on (nurse 40)

Yep (patient 96, female, 74 years)

You know they are just slowly reintroducing that now to help control the blood pressure a little bit (nurse 40)

Aha (patient 96)

While simple explanations were given at times, patients' understanding of the information was rarely checked or time allowed for questions:

I've withheld your heparin dose this morning. We give you a little dose of heparin, ... a sort of blood thinner, and in simple terms just to stop any clots, DVTs (nurse 27)

Mmmmm (patient 53, male, 74 years)

Heard of DVTs? People on flights? (nurse 27)

Mmmmm (patient 53)

Well, the heparin injection is there to....just a prophylaxis to prevent that basically, until we get the drains and things out, so we withhold that, so I'll give you that injection when I get back from my other patient (nurse 27)

On only one occasion in the observed period did a nurse attempt to confirm the patient's level of understanding regarding his medication:

I know you said you have a fair idea of what warfarin is? (nurse 7)

Yes, I've got the leaflet and the pharmacist said she would come back and see me this afternoon (patient 15, female, 46 years)

Oh, good (nurse 7)

Once a degree of understanding was confirmed, however, the interaction was completed without further examination of the extent of the patient's knowledge. The nurse in this interaction seemed satisfied that further information giving would be undertaken by the pharmacist. This willing transfer of responsibility to the pharmacist was accompanied by the notion that discussion of medications only occurred immediately prior to discharge:

Should I have these things at home? (patient 88, female, 84 years)

A medication script? The pharmacist will do that when you are ready to go home (nurse 16)

The pharmacist will go through all your tablets, you will have changes to them now you've had surgery (nurse 40)

Yes, we'll sort it all out and we'll send you home with a list (nurse 29)

Failure to recognize opportunity

On the occasions that patients sought further information, nurses appeared to not recognize the opportunity presented to inform and engage them in participatory medication management:

What is it? [referring to injection] (patient 2, male, 56 years)

It is an antibiotic (nurse 1)

What's the name? (patient 53, male, 74 years)

Metoprolol, have you ever been on that? Or betaloc is its other name? (nurse 27)

Hmmm (patient 53)

What is potassium for? (patient 10, male, 65 years)

It assists cells in the heart to contract. You look tired have a rest (nurse 3).

These data identify that the process of medication management was focused on administration and that little attempt was made to include patients in the process either by providing information or by welcoming questions.

The observational data from the nurse–patient interactions were supported by two focus group interviews with nurses. In response to the direct question, how do you facilitate patient participation in medication management? the nurses in the first focus group described the process used to engage patients in medication management. These descriptions demonstrated an understanding that the process involved interaction and discussion with patients but also highlighted that patient participation was not a planned focused activity.

Ambivalence towards facilitating participation

When doing something like medication you say ‘this is your medication’ and ‘do you know what that is for’ because then it shows they are part of the process and shows their understanding (nurse 3)

And also not just giving them medication and say ‘here take this just because’...hopefully they have an understanding of it and will hopefully carry on at home (nurse 4)

So with a particular drug we will have a conversation of what it is and why it is important to know how much to take to control x, y, or z and when you go to the doctors they will want to know x, y and z. [We explain to them] why people would look to them for that information. So demonstrating why they need to be responsible for their own knowledge (nurse 2)

The nurses outlined instances that supported patient participation in maintaining safe medication yet in doing so seemed unaware that they identified gaps in their own medication practices:

They could say I don’t take that tablet. They know their tablets for example and there’s a different one in there and they’ll say ‘what’s that? That’s not mine.’ Then that will make you

double check, so it can improve it (their safety) (nurse 4)

And with allergies, I find myself saying we’ll give you this and they say no I’m allergic to that and we can try something else (nurse 2)

In the second focus group, the nurses were provided with feedback outlining the major findings from the study. The nurses appeared to be surprised by the data. In response to the study finding that only 8.2% of patients could list all their prescribed cardiovascular medications prior to admission and prior to discharge, they discussed ideas that could facilitate patients’ involvement in medication management. It was clear that nurses did not normally consider patient participation in medication management as integral to their daily goals of care.

Indeed, the discussions indicated ambivalence with words such as ‘maybe’ ‘could’ and ‘sometimes’ leading most responses:

Maybe we should be more encouraging of them getting involved with their medications, because they’re the ones that are going to be managing it at home instead of us just taking over (medication management) (nurse 5)

Could they be doing it themselves (medication administration) with us just supervising? (nurse 8)

Sometimes the change in medications isn’t really communicated to the patient as well. Sometimes you might bring up, oh, this dose has been changed or you’ve been put on this medication and they (patients) have no idea (nurse 11)

Also think about how we educate patients and how we do medications, are we actually going through the packaging with them by the bedside or are we just handing them a little container of pills and going this is for this, this is for this, this is for this. I’d probably forget what was what too if I just had heart surgery as well (nurse 5)

Nurses were then asked to consider other potential barriers to patients participating in their medication management. Nurses found several reasons to explain why the process of encouraging patients to participate was absent from their routine care delivery:

A lot of them don’t remember (their medications) (nurse 1)

A lot of them don't realize why they are on something. And this may be the first time they have had the pressure of someone asking them to understand (nurse 3)

With the effects of bypass surgery they may not take everything in (nurse 5)

There is always a change in medications and the use of generic names vs. brand names. Because there were some patients that we had that were used to the brand names and we were using generic names so that's a major thing (nurse 10)

I'm not sure if there is a relationship between language barrier and medication knowledge as well. Because some patients would, if you were to discuss medications, not understand and explaining the medications would just highlight their difficulty in that area. So patients would just say ok, I'll just leave it to the experts, rather than highlighting the reality that they've got difficulty in that area (nurse 9)

Despite the fact that the patient group under discussion had a chronic cardiac condition that would require them to manage their own medications effectively once discharged, the nurses in this study did not appear to consider that there may be strategies that could be employed to assist patients overcome the identified barriers.

Discussion

All patients had changes to their cardiovascular medications as a function of their surgical admission. This involved commencing new and ceasing old medications. As a result, their ability to provide a complete list and state the purpose and side-effects of their current cardiac medications was lower than their preadmission knowledge. While medication change after cardiac surgery is not surprising, patients' lack of knowledge and understanding about the change is unexpected given the many opportunities available to nurses to engage actively with patients regarding their medication management plan. Findings indicate that nurses did not routinely take advantage of these opportunities to facilitate patient participation in medication management while hospitalized and

that interactions that did take place were for the most part task-focused and superficial.

Patients' lack of knowledge about the prescribed medications and their side-effects at discharge is concerning given the chronic nature of cardiovascular disease. This patient group is highly likely to require long-term medication treatment following discharge and is to be responsible for managing their medications on a daily basis. The problem of inadequate knowledge is two-fold. First, knowledge of medications has been identified as an important factor in adhering to medications^{26–28} and second poor knowledge of discharge medications may lead to increased hospital readmissions related to medication mismanagement.^{26,29,30}

Two explanations for patients' poor knowledge of their cardiovascular medications pre-discharge are possible. Patients may have received information regarding their discharge medication plan but at a time when they were not ready or were unable to comprehend the information as a result of cognitive and memory alterations that occur following this type of surgery. It is also possible that they were never adequately informed of their planned discharge cardiovascular medications.

Patients' readiness for information about their medications during hospitalization requires careful deliberation as to timing and frequency of the information exchange. Several factors impinge on patients' ability to retain information about their medications particularly during the early stages of recovery. Cardiac surgery is major, and during the recovery period patients commonly report concerns about their comfort, specifically pain, sleep and anxiety.^{31–33} The urgent need to focus on comfort needs may limit patients' ability to receive and process information adequately during the acute phase after a surgical procedure. Although cognitive decline following cardiac surgery has been reported^{34–36}, patients' in this study demonstrated capacity to understand their medications at both pre-admission and pre-discharge. At the time of their pre-admission, the majority of patients were able to list

and state the purpose of their cardiac medications. The results of the cognitive assessment administered pre-discharge indicated that the majority of patients had no cognitive impairment suggesting that these patients may have been able to understand and remember their medications. Although patients received an individualized pharmacist review immediately prior to discharge, the majority of patients were unable to provide a complete list or state the purpose and side-effects of their current cardiac medications. It would seem that one review of medications with a pharmacist is insufficient for adequate patient understanding. A review of the literature indicates that a variety of interventions have been used to provide education to patients about their discharge medication yet inadequate knowledge has continued to be reported.^{13,37-41} This anomaly indicates that the timing of such interventions must correspond to patients' readiness to receive information. This aspect of patient participation in medication management is vital and requires further investigation including comparison of an in-hospital and home-based interventions.

Likewise, the ability of nurses to facilitate effective patient participation in medication management requires consideration. While nurses demonstrated understanding of the ways they could engage patients in medication management and appeared to appreciate the role patients could play in maintaining their own medication safety, there was little evidence of nurses routinely engaging patients in their medication management or reinforcing their current knowledge. This mismatch between nurses' discursive accounts of their practice and their practical demonstration of this activity is not an uncommon finding. Baker *et al.*⁴² found clinicians rated themselves highly in seeking to involve patients in physical therapy goal setting; however, observations of practice indicated that few clinicians actually engaged patients in collaborative goal setting at any time.

An apparent barrier to nurses' facilitation of medication management is the time they spent

with patients. The reduced-length of stay associated with cardiac surgery limits the time available for education.⁴³ The way in which nurses interact with patients during this time may also be considered a barrier. These factors impact on the provision of effective, timely information and education. Time constraints have been identified as a major barrier to patient participation in other studies^{44,45}. When time constrained, nurses are likely to give priority to immediate physical care over psychosocial needs.⁴⁶

While nurses in this study did not identify time constraint as a barrier to the facilitation of patient participation in medication management, they did outline a number of other perceived barriers to effective education and knowledge transfer. The effect of major surgery on memory retention was considered to be an obstacle to patient participation in medication management. There was no evidence to suggest the nurses 'tested' this assumption and it may be that they chose to omit attempts to facilitate patient participation in medication management based on either their assumption or experience that patients were physically or mentally unable to participate. According to the nurses in this study, changes to medications and confusion created by medication trade and generic names posed another significant barrier to patient participation. Medication changes are not unexpected for patients who experience acute care, particularly following cardiac surgery.⁴⁷ Rather than a barrier to patient participation in medication management, these changes can be considered an opportunity for patients to engage with multiple clinicians to learn more about their medication management so as to use medications therapeutically and safely. Given that medication administration usually occurs three times each day in hospital and, based on median length of stay, there are at least 24 opportunities for clinicians to facilitate patient participation in their medication management. These interactions constitute opportunities or missed opportunities for nurses to take an explicit role in facilitating participation for long-term health promotion.

Strength and limitations

Case study design is a comprehensive approach to exploring patient participation in medication management. The major strength of this approach is the use of data triangulation that encompasses the multiple system, process and patient factors that may impact on the realization of patient participation.

The use of 2-h observation periods provided a snapshot of clinical practice and may have missed interactions between nurses and patients where medication management was discussed in a more in-depth manner. It was expected that more medication interactions would have been captured during the 2-h observation period. Extending the data collection across several medication administration periods per patient may provide a more comprehensive evaluation of the facilitation of patient participation in medication administration.

Conclusion

Every patient had changes made to their prescribed medications as a function of their surgical admission. The time spent in acute care following surgical intervention presents patients with opportunities to learn about these changes to their medications to safely manage medications once discharged from hospital. Pre-admission, the majority of patients were able to list and state the purpose of their cardiovascular medications, whereas prior to discharge, few patients were able to achieve this.

Several factors were identified that may affect the opportunity for patients to participate in medication management during hospitalization. These were the short periods of time nurses spent with patients, the focus on the task of medication administration rather than on provision of education and promotion of independence, and nurses' ambivalence about the benefits of providing this education while patients are hospitalized. Indeed, further research is needed to explore patients' readiness and ability to learn about their discharge medications at this time.

Increasing opportunities for patients to participate in medication management is considered an important strategy for improving the safety and quality of medication management. To achieve this strategy a fundamental shift in the way clinicians currently provide post-operative care is required, specifically the involvement of patients in routine medication administration.

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