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The safe administration of medication: Nursing behaviours beyond the five-rights

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ABSTRACT

This paper discusses the findings from the observation phase of a more extensive, appreciative inquiry qualitative study exploring registered nurses' experiences of administering medications. The observations aimed to explore the participants' application of the five-rights of medication administration in practice. Twenty registered nurses working in inpatient medical/surgical units at a regional Australian hospital were observed administering medications from the commencement to the completion of their shift. A data collection tool based on the five-rights of medication administration was used. The findings indicated that medication administration was not as routine as the rights framework suggests. Indeed, what was observed rarely reflected all the criteria of the rights framework. Notably, in practice, some of the rights were unable to be observed because the critical thinking that underpins the rights are implicit. However, the participants were observed to implement strategies beyond those described by the rights framework that ensured safe and timely medication administration. In brief, medication administration in contemporary healthcare settings is more complicated than the linear process suggested by the rights framework. So more attention is warranted, to the safe practice strategies of nurses who, to deal with complex clinical contexts. Their person-centred strategies respond to patient circumstances and maintain safety.

1. Introduction

Medication administration is a core responsibility of registered nurses. Registered nurses across the globe are educationally prepared, morally responsible and professionally accountable to fulfil their roles safely (International Council of Nurses, 2012). Thus, nurses are also in a position to commit, detect and report medication errors (NPS MedicineWise, 2016). Nurses regularly encounter the challenges of safely administering medications in the delivery of healthcare for patients (Kim and Bates, 2013). Most nurses are taught safe medication administration using a framework known as the 'five-rights' (Kim and Bates, 2013). This framework is a globally accepted guide for safe medication administration practice. It is meant to ensure that the right *patient* receives the right *drug* at the right *time* in the right *dose* and by the right *route* (Sullivan, 1991; Institute for Safe Medication Practices, 2007).

Education providers use the rights framework to teach medication administration and to assess clinical competence in this task (Cooper, 2014). Moreover, researchers use the framework to audit medication administration practice for errors (Baker and McConnell, 1962; McGovern, 1992; Kim and Bates, 2013). Thus, this five-rights framework currently underpins the process of medication administration, but it is acknowledged to be complicated and risky, and sometimes medication errors occur. That is, the rights framework is not failsafe (Institute for Safe Medication Practices, 2007). Nevertheless, the evidence that challenges the suitability of the five-rights framework for contemporary nursing practice is scant (Grissinger, 2002; Institute for Safe Medication Practices, 2004; Pennsylvania Patient Safety Authority, 2011). The medication administration process involves multiple health professionals and health consumers. The process is embedded and entangled with other nursing responsibilities (Sitterding et al., 2014). Moreover, safe and effective administration of medications is more than just 'dishing out drugs' (Davis et al., 2005) because the complexity and unpredictability of competing demands on nurses' time impact their practice (Sitterding et al., 2014).

For example, organisational factors such as workload, staffing, supplies and interruptions can interfere with nursing workflow, leading to difficulty in complying with the five-rights framework (Duxbury

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et al., 2010a,b). An observational study of 176 rural Australian nurses confirmed that medication administration is rarely accomplished as a straightforward, discrete task (McKeon et al., 2006). Step-by-step frameworks like the five-rights do not acknowledge the demanding work environments and the interplay between the clinician, health system and consumer (Jennings et al., 2011). Additionally, the problem-focused perspectives and risk-identification approaches of the scientific disciplines dominate healthcare discourse to define deficits in medication administration practice and are limiting the inherent strengths of nursing practice (Benner, 2013).

The limitations of the rights frameworks to fit contemporary practice are shown in the multiple modifications made to remedy them (Pauly-O'Neill, 2009; Elliott and Liu, 2010; Bonsall, 2014; Baeke, 2015). For example, in Queensland, Australia, the patient's *right to refuse* a medication was added as the sixth right (Medication Services Queensland, 2009). The Australian Federation of Nursing added the *right* documentation and also the right to know the *effects* of the medication as a seventh step (Australian Nursing Federation, 2007). Six (or more) rights listed in various textbooks and policy documents are not consistent (Cateora, 2013; Baeke, 2015). Seven (Rantucci et al., 2009; Brotto and Rafferty, 2012; Pape, 2013); eight (Bonsall, 2014), nine (Elliott and Liu, 2010); ten (Parker, 2012); and even as many as 12 rights (Broyles et al., 2013) can be found in healthcare literature. Notably, there is no local, national or international consistency regarding these frameworks except that they are all based on the basic five-rights and claim to enable error-free practice (Kim and Bates, 2013).

The focus of the literature on medication administration identifies errors, problems and deficits, which diverts attention from safety enablers that are implicit in the everyday practice of skilled nurses. Notably, there is no research advocating that nurses ignore the five-rights, although literature about the inadequacies of the five-rights is emerging (Pauly-O'Neill, 2009). Aiming to take a more positive approach to understanding nurses' medication administration practice, this researcher undertook an appreciative inquiry study of medication administration practice. Appreciative inquiry is a philosophy and methodology that seeks to understand the strengths and capacities of practice (Trajkovski et al., 2013). This paper discusses the findings from Phase 1 of a larger study that aimed to explore the practices developed by registered nurses to safely administer medications in complex and challenging acute care clinical settings (Martyn, 2015). The objective of Phase 1 was to observe the medication administration practices of the participants and to observe how they applied the five (or more) rights. The practices covered organisational and other contextual factors affecting how nurses administered medications. The participants of the study, were interviewed in Phase 2 that aimed to 'make sense' of these findings from Phase 1 (Martyn and Paliadelis, 2019).

2. Method

The appreciative inquiry methodology used in this study to explore nurses' experiences in complex and changing practice environments is a descriptive, qualitative methodology (Thorne, 2014). The researcher was an experienced registered nurse who believed that nurses' contribution to safe medication administration is poorly reported in the literature. Therefore, an appreciative inquiry approach was taken to the data analysis of participant observations allowing the study of practice from a strengths-based perspective (Kowalski, 2008). In any participatory observation study, there is a chance that participants will change their practice in the presence of an observer (Richardson-Tench et al., 2014). Therefore, to reduce the chance of this change, known as the Hawthorne effect (Richardson-Tench, Taylor et al., 2014), the researcher, as a registered nurse assimilated into the workplace context and shadowed each participant for an entire working day rather than only observing specific medication practice (Meyer-Massetti et al., 2011; Adhikari et al., 2014).

This study took place in the emergency, medical, surgical and combined intensive/coronary care units of a 120-bed public hospital in regional Australia. Purposive recruitment of registered nurses was by invitation using posters on staff notice boards. Each respondent received an information package detailing the study aims, research methods, participant commitment and the ethical processes of the health service and university involved described below. Participation was confirmed in a consent form that had to be signed. The twenty registered nurses who participated in this study are identified as N1 to N20.

An observation tool was designed for this study by the researcher and the study supervisors who were experienced registered nurses, academics and researchers. The tool reflected the six rights for safe medication administration framework adopted by the host hospital that included the usual five-rights plus the right to refuse (Medication Services Queensland, 2009). The tool was piloted, and minor modifications made before implementation. Data collection involved the completion of an observation tool each time medications were administered by the participant. Each observation tool was called an *episode.* An episode commenced when the participant reviewed the patients' medication chart, and it concluded when the medication was given, and the chart signed. The episodes were organised chronologically at the end of each observation shift and their contents reviewed.

Initially, each episode was analysed individually to track whether it had been completed. Then the episodes were examined collectively, to provide the full story of the medication-related workflow. The researchers' field notes enabled tracking of participant activity throughout the day. Cross-referencing the data in this way strengthened the reflective connection between all data (Dowling, 2006). This appreciative strengths-based lens was applied in the analysis to identify the positive features of the participant's practice and how they responded to contextual barriers, in relation to medication administration. The researcher conducted a thematic analysis, which was checked by the study supervisors for category formation and data fit.

This study had ethical approval from a health service and a university, requiring the RN researcher to intervene in any case of potential patient harm. The approval stipulated that the researcher provide patients with an information pack outlining the study before seeking their written consent to observe the medication administration process.

3. Findings

The twenty participants ranged in years of experience from less than one year to greater than ten years. In total, 136 nursing hours were observed, that included 192 episodes of medication administration. The episodes were identified as either *routine* or *non-routine*. The routine episodes (151) are discussed first and were those that were completed by the participants, albeit with complicating and confounding contextual factors. All unfinished episodes (41), in which participants did not fully complete the medication administration were classified as non-routine medication administration, and their characteristics are discussed after the routine episodes.

4. Routine episodes

Oral (42%), IV (21%) and subcutaneous (8%) medications were the most commonly observed routine episodes. Their administration aligned more closely with the rights framework than non-routine episodes because they were usually commenced and completed by one participant. However, routine episodes were not always without interference or interruption and some extended past the prescribed time. Participants were observed managing multiple medication charts, where it was impossible for the observer to discern which rights were addressed when the simultaneous administration of more than one medication in more than one form was observed. However, a range of safety checks were observed in all but 3 of the 192 episodes. In those 3

cases the researcher intervened because of suspected or potential medication errors. Only one of the episodes was halted because the participant was about to use the wrong form of the right medication. The other two episodes were confirmed as cases of researcher inattention. The findings below are organised to reflect the observation tool format.

4.1. The right patient

The 'right patient' requires that the patient identity must be confirmed before administration occurs (Queensland Health, 2012). The participants did this by questioning patients or reading identity bracelets and medication chart labels. Participants asked patients a series of questions like, 'Can you tell me your name?' or 'What's your full name?', then, 'What's your date of birth?' or 'When's your birthday?', and finally, 'Do you have any allergies?' or 'Are you allergic to anything?' which clarified allergy status and went beyond the right patient requirements. However, checking that the participant had the right patient was not observed for every episode. Instead, some participants demonstrated knowledge of the patient's identity by using their name.

Checking identification bracelets and medication chart labels were not always straightforward. For example, in the emergency department, many patients did not have an identification bracelet. Additionally, some bracelet details were incorrect and in one episode (N9), the chart label was wrong. Participants used multiple strategies to correctly identify patients and charts to rectify these problems as part of their regular daily activities.

Patients with cognitive impairment, hearing impairment or reduced levels of consciousness confounded the process of checking identity. N17 repeatedly tried to identify a patient through questioning, but the patient refused to answer, saying things like 'What does it matter?' N17 finally verified the patient identification using the patient's bracelet instead.

4.2. The right medication

Checking for the right medications were observed when participants read the medication chart and medication packaging, explicitly questioning patients about medication allergies and checking the medication expiry date. However, checking the expiry date was not always straightforward because tiny lettering and non-contrasting print on medication packaging compounded by poorly lit environments were observed to create a problem. N19 habitually used a ball point pen to circle the expiry dates on packages for easier identification. N15 used a smartphone as a torch to see expiry dates in dimly lit rooms, as a calculator to confirm medication doses, and as a clock and an alarm reminder for administration times. Magnifying glasses were kept in the medication preparation area of the emergency department to assist staff in reading labels and expiry dates.

Communication with colleagues and regular consultation with patients and prescribers about medication administration was observed. Participants advocated for patient's needs by asking prescribers to order specific medications such as anti-emetics and analgesia. Prescribers were informed by participants about the right medications for pain and discharge supplies. N20 had several conversations with a prescriber to have adequate analgesia ordered. Similarly, patient advocacy was also observed when prescription errors were discovered. For example, N11 organised a prescription amendment after finding the same medication had been prescribed twice by different names. Furthermore, participants were observed consulting with patients and used pharmacology resources and hospital protocols to guide their practice. In brief, participants used multiple strategies to ensure that the right patients received the right medications, but it was seen to be a complicated, time-consuming process at times requiring tactful communication with prescribers.

4.3. The right dose

Right dose actions by these participants included calculating and checking medication doses, checking the frequency prescribed, and correctly completing the medication chart. Frequent trips to the pharmacy storage area to obtain medications to meet the right dose were observed. Participants assisted prescribers in ordering the specific dose and time protocols of venous thromboembolism (VTE) prophylaxis by notifying them of pathology results. Participants used a range of resources to verify correct medication dosages. They consulted with patients and sometimes relatives about the usual dose of medications. These conversations consistently included elements of patient education.

4.4. The right time

Timely medication administration was the most significant challenge and a priority for these participants. P*re-setting* parenteral medications was one strategy observed on 24 occasions and undertaken by 50% of the participants. The pre-setting process consisted of checking the prescription and medication with another nurse and then setting it aside in the locked medication room for administration later. This process was unique to the medical and surgical wards and although differed from the recommended protocol, it saved time when multiple parenteral medications were due at the same time.

However, despite attempts to be prepared, time delays were commonly observed. For example, N16 concluded one episode of medication administration two hours and fourteen minutes after the initial request for a prescription. This participant took the medication chart to the prescriber three times during the shift to order blood products. N16 attempted to hasten the process by gathering pathology results for the prescriber. The prescriber was rude and obstructive, but N16 did not desist. Instead, N16 responded by saying 'Oh come on doctor; I've got the path results and chart here for you.' Finally, the prescriber completed the prescription enabling N16 to commence the administration.

Issues of environment and equipment impacted the participants' workloads. Participants became resourceful to avoid further delays in a patient's treatment. N14 concealed an infusion pump in readiness for when an intravenous catheter was inserted. The intravenous equipment trolley was the other piece of equipment most likely to be hidden away to avoid delays. Additionally, participants re-purposed equipment such as dressing trolleys to transport multiple medications.

Other attempts to facilitate timely prescribing were observed. For example, N1 contacted the prescriber when a patient arrived, but did not receive a completed prescription for hours. In some cases, when prescribers were continually unavailable to complete orders, N14, N16 and N19 gave medications from the patient's own supply, without a prescription. Administering medication in this non-standard way was done in consultation with the patient even though this practice breached health service guidelines and the spirit of the five-rights framework.

A further time-saving measure observed was the *multitasking* strategy used by many participants. Multitasking, by simultaneously working with multiple medication charts, most often occurred in the treatment room during medication checking and preparation activities and always involved other nurses. In general, many contextual factors impacted workflow, but participants managed their time by being adaptable and developing strategies to facilitate timely medication administration.

4.5. The right route

Ensuring the right route was more straightforward than the other rights because the prescriber documents this and medications are in forms readily identifiable as route specific. However, participants were observed to confirm the route by comparing the medication to the

prescription and other reference materials. The protocol in this setting was for two people to check all parenteral medications before administration. Knowledge of the facility protocol may explain why participants were vigilant with parenteral medications and reviewed pharmacology and manufacturer resources. N1 meticulously checked before preparing any medications for a peripherally inserted central catheter regimen. Likewise, all participants checked intravenous medication rates and compatibilities carefully.

4.6. The right to refuse

The last right relevant to this study is the right to refuse. Many participants explicitly sought consent by directly questioning patients. Offering the right of refusal, was observed as asking questions like, 'ready?' or 'are you happy to take this?' The participants also negotiated the administration with patients by providing information and education.

Specific communication strategies were observed in several episodes. For example, N16 used handwritten notes to gain consent from a patient who was profoundly deaf. In brief, participants did not always explicitly request permission to administer medications, nor did they coerce patients. Instead, education, information and encouragement were used to ensure patients understood the need for the medications. However, there were three refusals, and the participants listened to the patient's reason for refusal and provided information about the consequences. The participants then documented the outcome of these interactions in the patients' notes.

In summary, routine medication administration was not a simple task as suggested by the rights framework; instead, it was observed to be a complicated, convoluted and time-consuming activity requiring cooperative teamwork, diplomatic lobbying and patient-centred strategies. The non-routine episodes were more complex and are discussed next.

5. Non-routine episodes

Differing from routine episodes, these non-routine episodes were commenced but not concluded by the participants. Twenty-four of these types of episodes were *abandoned* episodes. Abandoned episodes were incomplete because the participant was either forced or decided to cease medication administration. A common reason for abandoning an episode was that, after preparing to administer the medication. The participants identified that the dose had already been given. For example, medications that were administered in other departments such as ED, were sometimes not recorded in the regular medications section of the chart. Participant N9 encountered this, immediately terminating the episode and noting the earlier dose in the correct section of the medication chart. Other reasons for abandoning an episode were that the medication was not available, the administration was not appropriate as in the case of the incorrectly duplicated prescription, or the patient refused the medication.

As noted earlier, pre-setting was a typical behaviour used to prepare for times when multiple parenteral medications were prescribed for numerous patients at the same time (0800, 1200, 1800, 2200 h). The necessary checks were completed at the time of pre-setting the medication, to save time. If the participant returned to the pre-set medication and concluded the administration, this was categorised as a routine episode. Extensions of previously commenced episodes were tracked, combined and classified as routine. However, on first analysis, all pre-set episodes appeared to be abandoned. It was only after reflecting on the field notes and chronologically connecting the participant workflow that the routine and non-routine preset could be distinguished.

Hand-offs (8) were those episodes where the participant gave the medication to a non-participant who then completed the administration. This action resulted from a change in clinical or patient care priorities. For example, N13 handed off a subcutaneous injection to a novice for the learning opportunity. Similarly, N11 handed off medication to a colleague to prioritise more critical patient care activities. In brief, hand-offs typically related to competing demands, particularly at busy times of the day, when participants were multitasking.

Finally, nine medications were checked by participants but then delegated to non-participant nurses. *Checking* included confirming the medication dose and type against the prescription with another nurse. Participants were observed to check the medical records of the patient's clinical status and pathology results. Participants also confirmed previous dosages and reviewed the prescriptions for errors during the checking process before confirming the medication for the non-participant to administer. Sometimes checking coincided with other nursing activities. For example, N10 checked medications in the corridor while on the way to the treatment room and again while consulting with a doctor. In brief, participants used their knowledge of the patients' medical condition in tandem with pharmacology resources and healthcare protocols as part of the checking process.

In summary, the non-routine episodes highlight the multi-directional nature of medication administration that is integrated into the full range of nursing activities. Non-routine episodes did not reflect the step-by-step processes assumed by the rights framework. They were frequent and time-consuming. Furthermore, the distinction between the non-routine and routine episodes was not always clear-cut.

6. Discussion

The medication administration episodes observed in this study confirm that the process was not simple. The findings support earlier studies about the complexity in acute care settings and added to the understanding that nurses often go beyond the five-rights to safely administer medications (McKeon et al., 2006; Pauly-O'Neill, 2009; Sitterding et al., 2014). It was not possible for these participants to adhere to the step-by-step framework during every episode because they were practising person-centred care.

The complexities described in this study are known contributors to medication errors (McKeon et al., 2006; Hughes and Blegen, 2008), yet the prevalence of errors in this study was considerably less than the statistics presented in the literature (Mansouri et al., 2013). Minimisation of errors in this study related to the ethical obligation for the RN observer to intervene if imminent patient harm was perceived. A Hawthorne effect may also have impacted the error rate (Kim and Bates, 2013). While the pre-setting behaviours observed in this study are likely to be perceived as unsafe precursors to errors, there were none observed during pre-setting medications. The pre-setting behaviour was unique to this study as no other literature describes pre-setting as a nursing action. Additionally, this nursing response to workload pressures was isolated to the medical and surgical areas where multiple medications are due at the same time.

As noted above, despite the widespread use of the rights framework to guide medication administration, there has been no significant reduction in error rates reported in the literature (Runciman et al., 2003; Roughead and Semple, 2008; Agyemang and While, 2010). While general adherence to the rights framework was observed in practice in this study, the participants also worked beyond the rights framework to ensure safe and effective administration of medications (Martyn and Paliadelis, 2019). The nursing strategies found to contribute to the safe management of medications provided unique insights that have not focused, on problem-based approaches and observed for errors (McKeon et al., 2006; Kim and Bates, 2013; Cooper, 2014) but sought to identify practices that promote safety. Despite facing challenges from organisational and contextual factors, these participants safely administered medications, provided timely information and education to patients and worked collaboratively to do so (Duxbury et al., 2010a,b; Folkmann and Rankin, 2010; Sitterding et al., 2014).

The findings of this study confirm suggestions in the literature that the rights framework does not fit contemporary nursing practice

(Grissinger, 2002; Institute for Safe Medication Practices, 2007). This study has built on what is known about the five-rights framework in practice by exploring what nurses do that supports safe medication administration practice. These nurses were observed to apply clinical reasoning and situational awareness to inform their decision-making for implementing person-centred interventions (Levett-Jones, 2013; Sitterding et al., 2014).

The findings of this study support existing literature, which reports that nurses play a vital role in medication safety (National Prescribing Service Limited, 2014) and highlighted the advocacy role described in earlier studies that required these participants to go beyond the rights framework (Rantucci et al., 2009). Consistent with the literature about the nurses role as the glue to achieve positive patient outcomes, the participants in this study acted as patient advocates and clinician co-ordinators, bringing personnel and resources together to safely administer medications and enable person-centred care (Kelly and Rucker, 2006; Folkmann and Rankin, 2010).

The linear five-rights framework is an accepted global standard for safe medication administration, and until now remains largely unchallenged in the literature. While medication administration has been extensively studied, the focus has been largely on identifying risks, deficits and errors attributable to health professionals and the context of health care (Keohane et al., 2008; Roughead and Semple, 2008; Westbrook et al., 2011). Very little research has explored nursing practice from a place of strength and appreciation. This study has sought to focus attention on positive and productive nursing practices by adopting an appreciative inquiry methodology to identify behaviours that enable safe medication administration, some of which went beyond five rights (Kavanagh, 2010; Knibbs et al., 2012; Trajkovski et al., 2013). This study found that medication administration was not a linear process or routine in nature, as there were numerous influences, interruptions and challenges that impacted on the participants practice that could not be addressed by the rights framework alone. This study identified that the nurses' used clinical judgement to safely and effectively manage the process of medication administration.

The study contributes a new frame of reference for medication administration research to explore the strengths in nursing practice. Developing an evidence-based effective safety framework for medication administration is a recommendation from this study. This study has made a beginning contribution to that body of literature.

7. Conclusion

This study has shown that despite contextual complexities and the limitations of the rights framework these participants accomplished safe and effective medication administration. The five-rights framework does not acknowledge the integration of medication administration with other nursing activities. Nor does the framework reflect the critical thinking that underpins practice. The registered nurses in this study demonstrated person-centred strategies to administer medications safely and promptly.

The strategies they implemented to manage workflow, interruptions and obstacles were sometimes inconsistent with hospital policy and the rights framework, making it clear that contemporary healthcare environments challenge the appropriateness of such frameworks for medication administration. This study suggests that further strengths-based research is required to explore the development of more relevant and sophisticated frameworks that are informed by contemporary practice. Findings from such research will better reflect reality and recognise the positive contributions nurses make to patient safety.

Financial disclosure

Nil.

Conflicts of interest

Nothing to declare.

Ethical approvals

This study had ethical approval from the human research ethics committees of Queensland Health (HREC 10/QCQ/16) and the University of New England (HE10/121).

Appendix A. Supplementary data

Supplementary data to this article can be found online at https://doi.org/10.1016/j.nepr.2019.05.006.

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