

Coping with information silos: An examination of the medication management process in residential aged care facilities (RACFs)

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Abstract: The aim of this study was to examine the actions of geographically dispersed process stakeholders (doctors, community pharmacists and RACFs) in order to cope with the information silos that exist within and across different settings. The study setting involved three metropolitan RACFs in Sydney, Australia and employed a qualitative approach using semi-structured interviews, non-participant observations and artefact analysis. Findings showed that medication information was stored in silos which required specific actions by each setting to translate this information to fit their local requirements. A salient example of this was the way in which community pharmacists used the RACF medication charts to prepare residents' pharmaceutical records. This translation of medication information across settings was often accompanied by telephone or face-to-face conversations to cross-check, validate or obtain new information. Findings highlighted that technological interventions that work in silos can negatively impact the quality of medication management processes in RACF settings. The implementation of commercial software applications like electronic medication charts need to be appropriately integrated to satisfy the collaborative information requirements of the RACF medication process.

Keywords. Information silos, residential aged care, medication management

Introduction

The effectiveness of medication management processes is one of the major concerns for the quality and safety of care delivery in residential aged care facilities (RACFs)[1,2]. In RACF settings, doctors are responsible for prescribing; however, they are not available full-time at the RACF sites[3]. The community pharmacies responsible for dispensing and packing medications are also located off site. The quality of medication management in RACF settings is therefore dependent on appropriate information exchange amongst these healthcare providers[4,5]. The inefficiencies and gaps in information exchange between members of the healthcare team are a prime source of medication errors, some resulting in serious adverse outcomes including hospital admissions and even death[2,6,7]. Yet the organisations

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involved in RACF medication management work in isolation from each other and usually store data in disparate systems (e.g. in the doctors' practice, community pharmacy) that may be sufficient to meet the information needs of the individual organisations but are unsuitable for inter-organisational information exchange[4,8]. The necessary information for continuity of medication management processes, whether in paper or electronic, therefore remains trapped in silos[9]. An information silo represents a data system that does not have the capacity to exchange data with other similar systems[10] (p.29). Information silos have been identified as the primary reason for fragmentation of care and lack of service coordination, which compromises the quality and safety of the delivered care [2-4]. Optimisation of information exchange processes for collaborative healthcare environments like RACFs therefore first requires an understanding of how the members of the healthcare team manage information fragmentation as part of their normal work practices. There is paucity of studies in RACF settings that explore how the geographically dispersed stakeholders cope with the existing information silos. The aim of this study therefore was to examine the activities performed by the members of the RACF medication management team to cope with existing information silos, and identify their implications for effective medication management in RACFs.

1. Methods

The setting of this research was a convenience sample of three RACFs in metropolitan Sydney, Australia and the community pharmacy which was the main medicines supplier for these sites. Qualitative research design was chosen due to its suitability for the exploratory nature of this study. The participants were recruited using purposive sampling methods, - based on their involvement in the medication process. Table 1 summarises the details of data collection across all sites. The data for this study were collected over period of seven months from May – November 2011. All aspects of the RACF work related to medication management were included in the study: prescribing, ordering, dispensing and delivery by the pharmacy, administration across shifts and monitoring activities. The data collection methods employed included semi-structured interviews, direct observations and examination of information artefacts.

Table 1. Data Collection Summary

RACF Site A (58 Residents)
<u>Field Observations:</u> 1 care manager, 1 deputy care manager, 7 RACF staff members, 2 pharmacy staff members, 2 GPs - (Total observation time: 28 hours)
<u>Interviews:</u> 1 care manager, 1 deputy care manager, 3 service staff employees (Avg. interview: 25 minutes)
RACF Site B (46 Residents)
<u>Field Observations:</u> 1 care manager, 1 deputy care manager, 8 service staff employees, 1 pharmacy staff member, 2 GPs - (Total observation time: 26 hours)
<u>Interviews:</u> 1 care manager, 1 deputy care manager, 1 nursing consultant (also serves Site C), 3 service staff employees (Avg. interview: 25 minutes)
RACF Site C (26 Residents)
<u>Field Observations:</u> 1 deputy care manager, 4 service staff employees, 1 pharmacy staff member, 1 GP (Total observation time: 20 hours)
<u>Interviews:</u> 1 deputy care manager, 1 nursing consultant (also serves Site B), 2 service staff employees (Avg. interview: 25 minutes)
Community Pharmacy
<u>Observations:</u> 2 pharmacists, 3 pharmacy staff members (Total observation time: 12 hours)
<u>Interviews:</u> 2 pharmacists, 3 pharmacy staff members (responsible for the medication packing for sample RACFs) Avg. interview: 18 minutes
RACF Organization Quality Management Team
<u>Interviews:</u> Quality team manager, 2 members quality management team (Avg. interview: 35 minutes)

Thematic content analysis was employed iteratively to analyse the triangulated qualitative data[11]. Electronic management and coding of data using NVivo (v.8) software[12] ensured automatic collation of all data extracts for open and axial coding[11]. Revision and finalisation of themes was achieved via triangulation and consensus between all researchers. Member checking of results occurred through follow up interviews with site managers, quality team manager and pharmacy staff.

2. Findings

The qualitative approach enabled examination of how different stakeholders cope with information silos which exist within and across their individual settings at different stages of RACF medication management process.

2.1. During Prescribing

Medication information that drives prescribing decisions is stored in silos across various electronic and paper based artefacts. The artefacts used during prescribing included doctors' client files, medical communication books, residents' medication charts, Webster packs, pathology results, vital signs records, residents' folders and hospital discharge summaries(see **Figure 1**). Besides doctors' files, all other artefacts mentioned above are stored at the RACF sites. Doctors often rely on face-to-face conversations with the senior RACF staff member to obtain a summarised view of information across artefacts. For all observed prescribing episodes, at least one of the senior RACF staff members was present with the doctor for their entire visit. They facilitated the doctor's work by explaining the purpose of their visit, searching for the required information and cross checking prescribing documentation. The documentation performed by doctors included signing off the medical communication book, updating the residents' medication charts and writing prescriptions for the new or changed medications. Despite the presence of the staff members during prescribing, errors in the documentation were frequently identified after the doctors have left the RACF sites. These errors included missing information(eg, dose), mismatch of information between charts and prescriptions, and missing signatures on the charts. To rectify these errors, staff were frequently observed faxing charts back to the doctors requesting corrections.



Figure 1. Doctors referring to multiple artefacts during prescribing at the RACFs

Coping with the information silos was more challenging when prescribing related activities were performed when the doctor was not present. This included situations requiring consultation with doctors on the telephone when an incident occurred to inform them of a resident's condition that required urgent attention. Doctors usually

consult their client files, when offsite, however as explained by the nursing consultant (Site B, C), these files are not likely to provide all required information: *“They [doctors] have their own files and they update those when they visit here. Well you would hope that they would do, I can’t say that it is gospel”*. Any changes to the residents’ medication regime in offsite prescribing scenarios are done by exchange of information and artefacts using telephone and fax as explained by a site manager: *“I will call them [doctors] and tell resident X looks like she’s got cellulites or her wound looks infected, they [doctors] might say look I’ll put her on a course of antibiotics so then what I could do fax that [medication chart] over to them and they would then write it, fax it back and then I would actually have to stick it in there [original medication chart]”*.

2.2. During Medication Ordering, Dispensing and Packing

Coping with information silos was observed as a major challenge for the community pharmacy. The pharmacy receives paper based charts and prescriptions from the RACFs. In case of any mismatch between the two, pharmacy staff either contact the RACF staff or the prescribing doctor to obtain the correct information. The pharmacy itself has two disparate electronic systems (one for dispensing and the other for Webster packing)(Figure 2) for maintaining pharmaceutical records. As the systems are not integrated; with any changes in residents’ medication regime, pharmacy needs to ensure that both systems are updated separately. During observations, pharmacy staff members were often identified struggling to resolve information mismatch across these four silos.



Figure 2. Information silos at the community pharmacy (left to right: residents’ medication charts, prescriptions, dispensing system, Webster packing system)

Another action taken by the pharmacy staff to cope with the lack of integration between electronic systems was the maintenance of a manual stock order list while packing the Webster Packs (**Figure 3**). This is important as the pharmacy staff usually pack two weeks in advance and therefore require adequate medication stock.



Figure 3. Maintaining the low stock list at the community pharmacy

2.3. During Medication Administration and Monitoring

The existence of information silos was recognised as the potential source of possible errors during medication administration. As described by a member of the quality management team: *“What we found was that you couldn’t rely always on the Webster pack matching the chart for a whole lot of reasons related to the chemist as well as the fact that doctors come in, change things, cease things, add things but don’t always get picked up”*. To minimise the possibility of administration errors, the organisation has introduced a weekly Webster pack checking procedure (Figure 4). This procedure involves pharmacy staff verifying the Webster pack with the chart, highlighting the list on the pack header and documenting the count of tablets on the pack header. RACF staff then cross checks the count of tablets and fills the weekly medication check sheet with the tablet count details for each resident (**Figure 4**). Depending on the facility size, this procedure can take up to 90 minutes. Changes to residents’ medications are frequent, resulting in re-packing of the Webster packs outside the regular checking day. Therefore for Webster packs delivered during other days of the week this procedure is not feasible as described by a site manager: *“I have to send for this [Webster pack] as we have to start the change straight away. They [pharmacy staff] will come and take this; they re-pack and send back to us”*. The medication administration records for the residents are spread across multiple signing sheets, which include sheets for regular packed medication, non-packed medication, PRNs (as required medication), wafarin and short-term medications. In the absence of a collective view of the medications to be administered, staff spent considerable time flipping through the signing sheets folder during and after administration rounds to confirm if all required medications have been administered for all the residents.



Figure 4. Steps in the Weekly Webster pack check procedure

Monitoring residents’ medications also relied on information across heterogeneous artefacts. As explained by the nursing consultant: *“I look at the progress notes. I look at the wound charts, the assessment charts. I look at the diagnosis and that the medications on the chart are for the diagnosis. I mean the doctors prescribe the medication so but I just check that they’re having the correct medications at the correct time”*.

3. Discussion and Conclusion

The findings from this study provide valuable insights into how information silos can impact on aspects of residential aged care delivery, medication management and resident safety. The findings highlight that while medication management processes involved coordination between different settings, the information driving the process

was not organised in a way that would support this kind of coordination. The information was stored in silos within each setting and, when exchanged, the individual settings had to take measures to adequately map information to the individual settings[13]. In most cases, these measures included telephone or face-to-face conversations to cross-check, validate or get new information. As has been identified in other healthcare settings, RACFs constitute a wide range of duplicated (exactly similar, not integrated) and fragmented (related but not similar, not integrated) medication information[14,15]. The redundancy of identical information can have both negative and positive impacts on the robustness of the process. For instance, this type of redundancy increases the risk of transcription errors, reduces process efficiency and limits the referential integrity of the information. However, it provides benefits by increasing checkpoints, providing information back-up and increasing system resilience[14,16]. Stakeholders and domain experts therefore need to carefully consider the costs and trade-offs in the process[16]. The issue of redundancy is more crucial for scenarios in which correlated information, vital for therapeutic decisions exists in silos. For example, information for a resident's care management was distributed across various artefacts: this included information of recent issues in the resident's electronic progress notes, vital sign data in the assessment charts, diagnosis and current medication lists in the medication chart and documentation of the existing assessments (eg, pain) in the care plan. The records in all these artefacts were vital nodes in the web of information needed to clearly depict residents' health status and inform therapeutic decisions[14,15]. Therefore a challenge for information system designers is to implement adequate information integration models which can select relevant information from this web of data, and present and exchange this in a timely way, without increasing the time burden on users[15,17]. The design of such systems needs to be driven by the information requirements of users. For instance, doctors need to identify the thresholds of different parameters (eg, vital signs) for individual residents which can impact on their treatment trajectory[18]. Implementation of commercial software without the appropriate customisation and integration needed to align it with collaborative work processes fails to address the issues of information silos and fragmentation[18,19]. It is therefore vital to engage representatives from all professional groups involved in streamlining the design and navigation of information which supports medication management[20]. There are also implications for the development of the personally-controlled electronic health record and its ability to align with existing information requirements of aged care environments like RACFs [21].

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