

# Nursing staff work patterns in a residential aged care home: a time–motion study

*Siyu Qian*<sup>1</sup> PhD

*Ping Yu*<sup>1,2</sup> PhD, Associate Professor

*David Hailey*<sup>1</sup> PhD, Professor

<sup>1</sup>School of Computing and Information Technology, University of Wollongong, Northfields Avenue, Wollongong, NSW 2522, Australia. Email: [sq992@uowmail.edu.au](mailto:sq992@uowmail.edu.au); [dhailey@ozemail.com.au](mailto:dhailey@ozemail.com.au)

<sup>2</sup>Corresponding author. Email: [ping@uow.edu.au](mailto:ping@uow.edu.au)

## Abstract

**Objective.** Residential aged care services are challenged by an increasing number of residents and a shortage of nursing staff. Developing strategies to overcome this challenge requires an understanding of nursing staff work patterns. The aim of the present study was to investigate the work processes followed by nursing staff and how nursing time is allocated in a residential aged care home.

**Methods.** An observational time–motion study was conducted at two aged care units for 12 morning shifts. Seven nurses were observed, one per shift.

**Results.** In all, there were 91 h of observation. The results showed that there was a common work process followed by all nurse participants. Medication administration, documentation and verbal communication were the most time-consuming activities and were conducted most frequently. No significant difference between the two units was found in any category of activities. The average duration of most activities was less than 1 min. There was no difference in time utilisation between the endorsed enrolled nurses and the personal carers in providing nursing care.

**Conclusion.** Medication administration, documentation and verbal communication were the major tasks in morning shifts in a residential aged care home. Future research can investigate how verbal communication supports nursing care.

**What is known about the topic?** The aging population will substantially increase the demand for residential aged care services. There is a lack of research on nurses' work patterns in residential aged care homes.

**What does this paper add?** The present study provides a comprehensive understanding of nurses' work patterns in a residential aged care home. There is a common work process followed by nurses in providing nursing care. Medication administration, verbal communication and documentation are the most time-consuming activities and they are frequently conducted in the same period of time. Wound care, physical review and documentation on desktop computers are arranged flexibly by the nurses.

**What are the implications for practitioners?** When developing a task reallocation strategy to improve work efficiency, effort can be put into tasks that can be arranged more flexibly.

**Additional keywords:** activity, long-term care, nursing home, process, time, workflow.

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## Introduction

It is estimated that the proportion of the Australian population aged 65 years or over will increase from 14% to 25% over the next 40 years.<sup>1</sup> This will substantially increase the demand for residential aged care (RAC) services. The situation is worsened by the chronic shortage of skilled nursing staff, high staff turnover and staff aging.<sup>2</sup> All these factors create a considerable challenge for the delivery of high-quality, safe and efficient aged care services.

Strategies like task re-allocation, process management and the introduction of information technologies are promising to help

RAC homes to overcome these challenges. However, the development and implementation of these strategies require a basic knowledge of work processes of actual care provision in RAC homes. This knowledge is also useful for nursing managers in distribution of staff with different qualifications and skills, estimation of workload and job allocation in RAC homes.

Nursing care and personal care are two important care services provided in RAC homes. Studies investigating personal care activities in RAC homes have examined the time spent by nursing staff on these activities,<sup>3–10</sup> with some describing the work

processes of personal carers in conducting specific activities (e.g. bathing, oral care).<sup>7,9</sup>

Studies investigating nursing care activities primarily focus on medication management because it is crucial to resident safety.<sup>11–16</sup> For example, Ellis *et al.* conducted focus group discussions with nurses to investigate medication administration in two Canadian RAC homes and found that nurses 'race against time' to complete medication administration.<sup>12</sup> In another Canadian study, Thomson *et al.* conducted a time–motion study to examine the time nurses spent on each of seven pre-defined steps in medication administration in a single RAC home and found that medication preparation and provision required longer than any of the other steps.<sup>14</sup>

One study described wound care and its documentation processes in an Australian RAC home.<sup>17</sup> That study identified several functional deficiencies in an electronic documentation system; for example, the system lacked a function to remind nurses about an existing wound chart, resulting in duplicated charts created in the system.<sup>17</sup>

There is a lack of research on the work processes that are followed by nursing staff to complete all types of nursing care activities. Therefore, the aim of the present study was to describe nursing staff work processes in providing nursing care and to examine the time, frequency and duration of each activity.

## Methods

The study was conducted from June to September 2013. The study procedure consisted of three stages: a preliminary study, a pilot study and data collection. The aim of the preliminary study was to develop a classification of nursing staff activities to be used in time–motion observations; the pilot study tested the feasibility of the data collection tool and enabled the observer to gain proficiency in observation using the activity classification system. Later, the observer moved on to collect empirical data that would be used for analysis.

Ethics approval was granted by the University of Wollongong Ethics Board subject to the approval of the management of the aged care organisation.

### *Training of the observer*

The observer was trained by an experienced researcher in the topic area in a 14-day observation of nursing staff work activities in an RAC home before the commencement of the study. Inter-rater reliability was not assessed because only one observer (SQ) was used.<sup>14</sup>

### *Preliminary study*

The preliminary study was conducted in five morning shifts (0630–1500 hours) at three units in one RAC home and one unit in another RAC home. As part of the preliminary study, one registered nurse (RN) who worked at the three units and one endorsed enrolled nurse (EEN) who worked at the other unit were observed.

Each day, the observer followed one person continuously for the entire morning shift. The observer recorded everything that person did in detail, such as flipping paper-based records, crushing tablets and preparing a cup of water. In all, 184 activities were recorded.

These activities were then entered into an Excel (Microsoft, Redmond, WA, USA) spreadsheet for grouping. The grouping was performed in discussion with an RN who had extensive RAC work and research experience. This led to a classification system of 116 activities grouped into 10 categories.

The classification system was then validated by two facility managers, two RNs and one EEN who worked in the two RAC homes. The content validity ratio for each activity ranged from 0.6 (agreed by four of the five reviewers) to 1.0 (agreed by all five reviewers). There was unanimous agreement on 96% of activities. Table 1 shows the resulting classification system of nurses' activities. A full description of activities is provided in Appendix I.

### *Pilot study*

The pilot study was conducted in seven morning shifts in eight units of the two RAC homes that were involved in the preliminary study. One day was spent on testing the feasibility of three data collection tools: an iPad (Apple, Cupertino, CA, USA), an iPod touch (Apple) and a Panasonic Toughbook Rugged Mobile Clinical tablet. The iPad was considered the optimal available tool for data collection.

The remaining 6 days were spent by the observer practising using the iPad to conduct time–motion observation. Commercially available software (InMotion Pro; Code Studio; <https://itunes.apple.com/us/app/inmotion-pro/id896925457?mt=8>, accessed 9 December 2014) was installed on the iPad to record time–motion data by recording the start and end time, as well as the duration, of an activity when the observer hit the activity button on the touchscreen. The start of a new activity indicated the end of a previous activity. On each day, one nurse was randomly selected for observation. If the person provided consent, the observer followed this person continuously throughout a morning shift.

### *Formal data collection*

#### *Setting*

Formal data collection was conducted in two units of an RAC home that were next to each other. Ninety-seven per cent of residents in these units required a high level of care. The mean age of residents was 83 years. Unit 1 had 38 beds and Unit 2 had 40 beds. There were one to three residents in Unit 1 who required percutaneous endoscopic gastrostomy (PEG) feeding tubes during this data collection period. No residents in Unit 2 required PEG feeding tubes.

In a typical morning shift in a unit, six personal carers provided personal care to residents and one nurse provided nursing care to these people. This nurse could be an RN, an EEN or a personal carer with Certificate IV Level II in medication management (referred to as a 'personal carer' hereafter). The personal carers only worked in Unit 2, because they did not have the qualifications to medicate residents who used PEG feeding tubes.

These nursing staff did not administer Schedule 8 drugs<sup>18</sup> (drugs of addiction), but they occasionally assisted with the administration and documentation of these drugs. The RAC home delegated responsibility for this task to an RN who would administer these types of drugs in both units together with another member of the nursing staff. This RN also had other duties, such as

**Table 1. Classification of nursing staff activities**

A full list of the activities is given in Appendix I. S8, Schedule 8 (drugs of addiction); PEG, percutaneous endoscopic gastrostomy; BGL, blood glucose levels; PRN, as required

Category	Activities
Medication administration	<p>Preparation</p> <p>Preparing a medication trolley (e.g. get spoons, cups, medication administration records, refrigerated medication, a rubbish bag for general waste)</p> <p>Locating or identifying a resident (e.g. look for a resident in a dining room, check whether a resident is ready for medication)</p> <p>Identifying, preparing or assisting in the preparation of S8 drugs</p> <p>Identifying or preparing an ordinary medication tablet, liquid, powder, eye drops, ointment, injection or puffer, using PEG feeding tubes etc.</p> <p>Preparing equipment for and checking BGL</p> <p>Bringing prepared medication and other supplies (e.g. tissue) to a resident</p> <p>Preparing PRN medication</p> <p>Preparing a resident for medication provision</p> <p>Provision</p> <p>Providing or assisting in the provision of S8 drugs, tablet, liquid, injection or patch or using PEG feeding tubes</p> <p>Providing ordinary medication tablet, liquid, powder, eye drops, ointment, injection or puffer, using PEG feeding tubes etc.</p> <p>Providing a PRN medication</p> <p>After provision</p> <p>Travelling back to medication trolley</p> <p>Disposing of clinical waste and general waste, putting medication (e.g. eye drops) back on the trolley</p> <p>Bringing or collecting spoons and cups to or from the wash-up room or washing them</p>
Wound care	<p>Preparing or cleaning the wound care trolley</p> <p>Preparing or caring for wound care</p>
Physical review	<p>Preparing or organising physical review equipment (e.g. a blood pressure monitor)</p> <p>Physical review for a resident</p>
Infection control	<p>Alcohol handwash, water handwash, putting on or taking off gloves (medication related)</p> <p>Alcohol handwash, water handwash, putting on or taking off gloves (non-medication related)</p>
Verbal communication	<p>Verbal communication with a resident, nurse, personal carer, other internal staff, external health professional, visitor (medication related)</p> <p>Verbal communication with a resident, nurse, personal carer, other internal staff, external health professional, visitor (non-medication related)</p> <p>Receiving, answering or making a phone call (to other staff, doctor, pharmacy etc.; medication related)</p> <p>Receiving, answering or making a phone call (to other staff, doctor, pharmacy; etc.; non-medication related)</p> <p>Shift handover</p>
Documentation	<p>Paper-based documentation</p> <p>Collecting or putting a documentation book from or back to a filing area</p> <p>Flipping, reading, writing an S8 drug documentation book</p> <p>Flipping, reading, writing medication administration records</p> <p>Reading, writing on daily medication orders</p> <p>Reading, writing on a paper note, handover sheet</p> <p>Flipping, reading, writing a wound care book or form</p> <p>Flipping, reading, writing a physical review book or form</p> <p>Flipping, reading, writing other documentation books (e.g. diary)</p> <p>Filing a document in a filing tray or filing book</p> <p>Electronic documentation</p> <p>Portable device</p> <p>Logging in or out of the electronic system</p> <p>Locating, reading, entering a resident's record in the electronic system on the portable device (medication related)</p> <p>Locating, reading, entering a resident's record in the electronic system on the portable device (non-medication related)</p> <p>Non-medication-related activities in the electronic system on the portable device</p> <p>Desktop computer</p> <p>Logging in or out of a desktop computer or the electronic system</p> <p>Locating a form, reading or entering data in the electronic system on a desktop computer (medication-related)</p> <p>Locating a form, reading or entering data in the electronic system on a desktop computer (non-medication-related)</p>
Print and fax	<p>Preparing a fax cover sheet (either typed on a computer or handwritten on a piece of paper)</p> <p>Faxing documents (e.g. stamp 'faxed' on a faxed document, file a faxed document)</p>

(continued next page)

Table 1. (continued)

Category	Activities
Transit	Printing or photocopying a document (e.g. form for transferring a resident to hospital)
	Pushing a medication trolley
	Pushing another trolley or pulling a trailer (e.g. wound care trolley)
	Walking or standing in corridor, dining room etc.
Staff breaks	Staff breaks (e.g. lunch break)
Other	Other activities not included above <sup>A</sup>

<sup>A</sup>Other may include turning on a TV for a resident, opening curtains, helping a resident make a phone call to the person's family member, etc.

meeting with doctors, greeting residents' relatives and answering emergency calls.

Medication administration was documented electronically for 18 months at Unit 1 but on paper at Unit 2. At both units, wound care and physical review were documented on paper, and then transcribed to desktop computers.

### Participants

Participants in the formal data collection were seven nurses who worked regularly in the two units to cover at least 80% of the morning shifts. Their work activities were representative of those in the two units. These seven nurses were one RN, four EENs and two personal carers. All provided nursing care to residents; they did not administer Schedule 8 drugs, but sometimes assisted with the administration of these drugs. The RN observed during the formal data collection period was a different RN to the one who administered Schedule 8 drugs.

The mean number of years of work experience in medication administration was 6 years. Five of the participants observed had more than 7 years experience, with the longest being 13 years experience.

The RN was observed in Unit 1. The personal carers were observed in Unit 2. The EENs were observed in both units. The observer made the best effort to reflect the roster pattern of these participants, given the constraints of changes in staff roster, availability of the observer and study time frame.

### Observation

The observation was conducted in 12 morning shifts, 6 days at each unit. On each observational day, one participant was observed continuously for the entire morning shift. Because morning shifts covered two medication rounds and most medications were administered in the morning, the present study chose morning shifts.

### Data analysis

The content validity ratio was calculated using the formula  $(n_e - N/2)/(N/2)$ , where  $n_e$  was the number of people who agreed with the item and  $N$  was the total number of people validating the activities.

The recorded data were exported to Excel spreadsheets for analysis. The unit of statistical analysis was activity. A Z-test was used to compare the proportion of time a nurse spent on each category of activities between the two units and between the three types of nursing staff. Statistical significance was assumed if  $P < 0.05$  for comparisons of the two units and  $P < 0.016$  for

comparisons of the three types of nursing staff.  $P$ -values are two-sided.

A diagram of nursing staff's work processes in the morning shift was drawn and presented to the nurse participants who provided feedback for its revision.

## Results

### Common work process of nursing staff in morning shifts

Fig. 1 shows a common work process that nursing staff followed in morning shifts. The shift started and ended with handovers. Three major tasks that a nurse performed during the shift were medication administration, wound care and documentation. Documentation was completed at the point-of-care and after care provision. If the nurse had time, he or she would undertake a physical review; otherwise, this task would be allocated to a personal carer who provides personal care. The nurse took a break after the morning medication round and before and after the noon medication round.

### Activity time

In all, 91 h of work were observed. More than 70% of nursing staff time was spent on verbal communication, medication administration and documentation. As indicated in Table 2, at both units, verbal communication took the biggest proportion of nursing staff time, with pure verbal communication the major format. This was followed by medication administration and documentation. There was no significant difference between the two units in the time spent on these activities.

However, significant differences were noted when examining the subcategories of verbal communication and documentation. The proportion of time nursing staff spent on concurrent verbal communication at Unit 1 was significantly greater than at Unit 2. 'Concurrent verbal communication' means a nurse was talking while undertaking another activity at the same time.

Because portable devices were used for medication documentation at Unit 1 but paper was used at Unit 2, the time needed for documenting electronically and on paper was significantly different between the two units. However, the proportion of time nursing staff spent on desktop computers did not differ significantly between the two units.

In an 8-h shift, nursing staff spent less than an hour on staff breaks, half an hour on transit activities, 20 min on wound care and 12 min on infection control activities. They spent the least amount of time on physical review, printing and faxing.

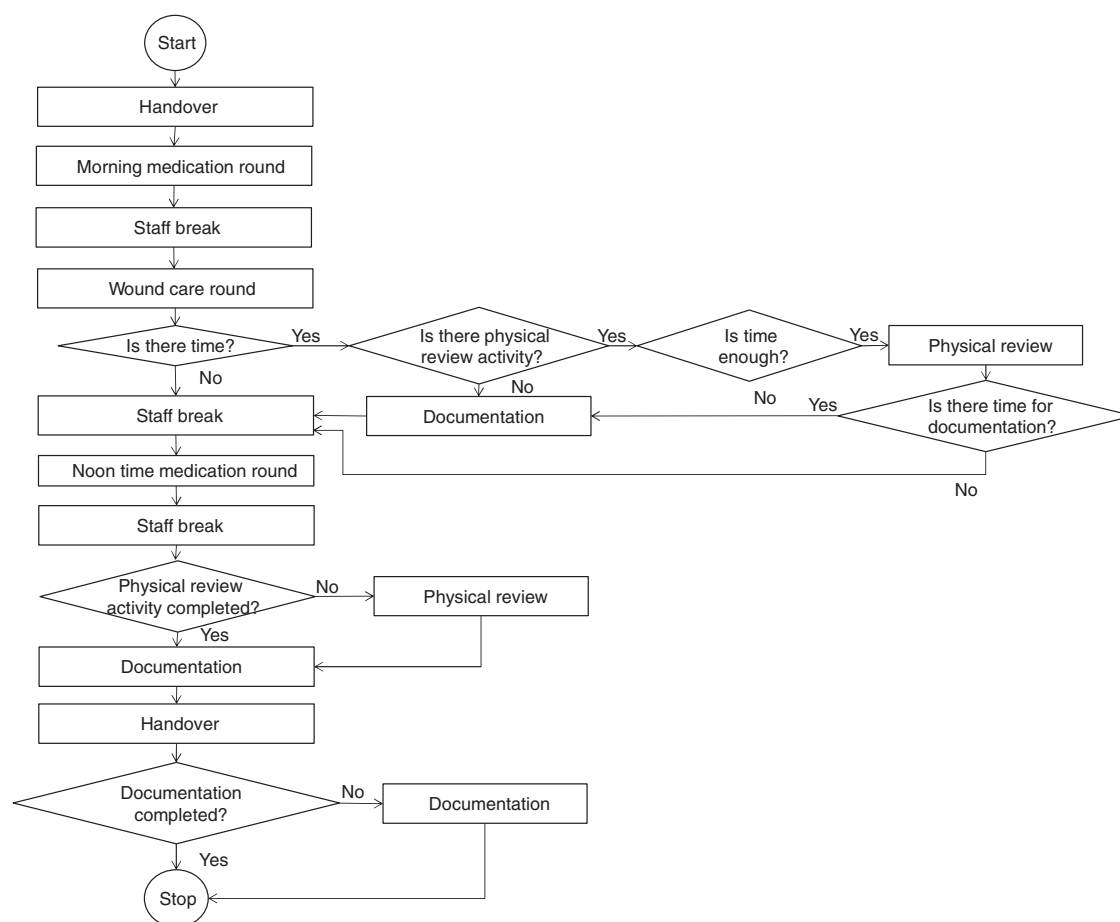


Fig. 1. Common work process for nursing staff in morning shifts.

Table 2. Time spent by nursing staff on each activity as a proportion and absolute time per 8-h shift  
CI, confidence interval

	Unit 1		Unit 2		P-value	Mean ( $\pm$ s.d.) duration for both units (s)
	Percentage (%) (95% CI)	Per 8 h (h:m:s)	Percentage (%) (95% CI)	Per 8 h (h:m:s)		
Medication administration	26.6 (23.7, 29.4)	2:7:29	25.1 (22.7, 27.6)	2:0:40	0.459	18 $\pm$ 24
Preparation	16.0 (14.2, 17.8)	1:16:49	16.9 (15.0, 18.8)	1:21:7	0.504	18 $\pm$ 23
Provision	8.0 (6.6, 9.4)	0:38:33	6.0 (5.1, 7.0)	0:28:57	0.983	31 $\pm$ 33
After provision	2.5 (2.1, 2.9)	0:12:5	2.2 (1.8, 2.6)	0:10:35	0.271	8 $\pm$ 10
Wound care	4.5 (3.4, 5.6)	0:21:29	4.4 (3.5, 5.2)	0:20:56	0.871	44 $\pm$ 41
Physical review	0.2 (0.0, 0.4)	0:1:1	0.3 (0.1, 0.5)	0:1:26	0.569	38 $\pm$ 37
Infection control	2.5 (2.0, 3.0)	0:12:6	2.8 (2.3, 3.3)	0:13:30	0.406	11 $\pm$ 15
Verbal communication	28.9 (23.7, 34.2)	2:18:46	27.2 (22.7, 31.7)	2:10:23	0.620	27 $\pm$ 84
Pure	23.2 (18.2, 28.1)	1:51:11	23.2 (18.9, 27.5)	1:51:17	0.995	31 $\pm$ 97
Concurrent	5.7 (4.6, 6.9)	0:27:35	4.0 (3.0, 5.0)	0:19:5	0.021	17 $\pm$ 34
Documentation	18.2 (15.9, 20.6)	1:27:34	20.6 (18.4, 22.7)	1:38:45	0.152	18 $\pm$ 29
Paper-based documentation	5.7 (4.4, 7.0)	0:27:17	14.3 (12.8, 15.8)	1:8:44	<0.0001	17 $\pm$ 26
Electronic documentation	12.6 (10.8, 14.3)	1:0:16	6.3 (5.1, 7.4)	0:30:1	<0.0001	21 $\pm$ 32
Portable device	4.5 (3.9, 5.1)	0:21:49	—	—	—	9 $\pm$ 10
Desktop computer	8.0 (6.5, 9.5)	0:38:26	6.3 (5.1, 7.4)	0:30:1	0.068	38 $\pm$ 42
Print and fax	0.3 (0.1, 0.5)	0:1:29	0.5 (0.1, 0.9)	0:2:28	0.366	47 $\pm$ 50
Transit	7.0 (5.9, 8.0)	0:33:21	7.1 (6.2, 8.1)	0:34:16	0.790	22 $\pm$ 20
Staff breaks	12.1 (4.9, 19.3)	0:58:6	9.9 (4.2, 15.6)	0:47:33	0.639	455 $\pm$ 631
Other <sup>A</sup>	5.4 (3.3, 7.5)	0:25:53	6.1 (3.8, 8.3)	0:29:4	0.673	69 $\pm$ 136

<sup>A</sup>Other may include turning on a TV for a resident, opening curtains, helping a resident make a phone call to the person's family member, etc.

### Activity duration

As indicated in Table 2, except for staff breaks and 'other', the average duration of each activity category was less than 1 min. The duration of each activity is provided in Appendix I.

### Activity frequency

In all, 14 073 activities were recorded, 7012 at Unit 1 and 7061 at Unit 2. Fig. 2 shows the average number of occurrences of each activity in each hour during a morning shift. The most frequently conducted activities (i.e. medication administration, verbal communication and documentation) followed similar patterns over time, peaking between 0700 and 0900 hours and again between 1200 and 1300 hours. Wound care was performed primarily between 1000 and 1200 hours. The number of infection control and transit activities fluctuated slightly over time.

### Differences among the three types of nursing staff

Fig. 3 shows the proportion of time that the RN, EENs and personal carers spent on the major tasks. Verbal communication included both pure and concurrent verbal communication. Significant differences were found between the RN and personal carers in infection control activity and between the RN and EENs in documentation activity. There was no difference in time utilisation between the EENs and personal carers.

### Discussion

The present study adds to the knowledge of nursing staff work processes and the time, frequency and duration they use to conduct work activities in RAC homes. The results show that there were certain work patterns that all the nursing staff participants followed to complete nursing tasks in morning shifts in an RAC home. The classification system of activities developed in

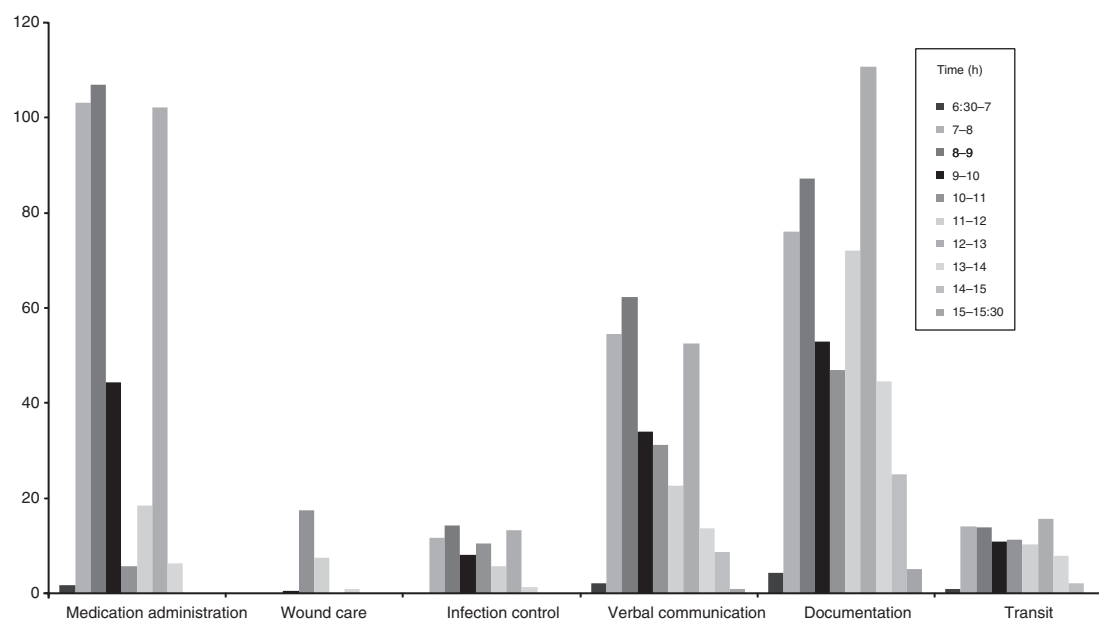


Fig. 2. Number of occurrences of main activity categories in each hour over an 8-h morning shift from 0630 to 1530 hours.

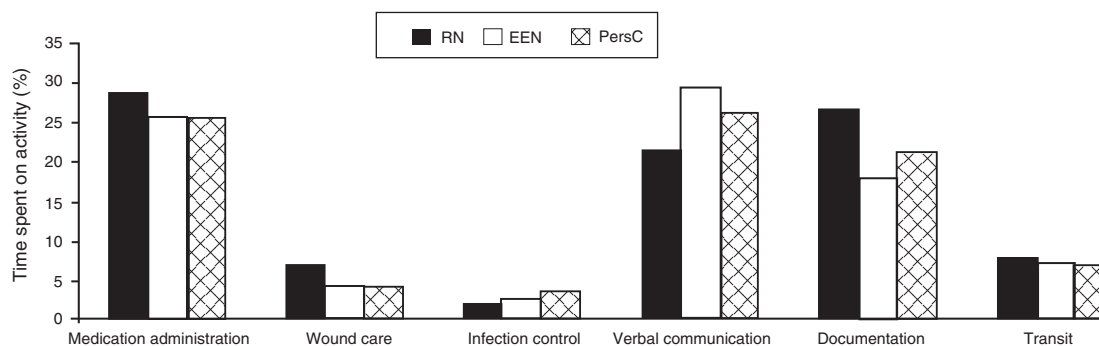


Fig. 3. Time expenditure on main activities by different types of nursing staff. Data show the percentage of time spent on each activity by the registered nurse (RN), four endorsed enrolled nurse (EENs) and two personal carers with Certificate IV Level II in medication management (PersC).



the present study is useful for researchers and practitioners in conducting similar studies in RAC homes.

The findings of the present study show that the RN spent more time on medication administration than on documentation. This finding is the same as that reported previously in a study that used a work sampling method to collect data in an Australian high-care home,<sup>6</sup> as well as in an Australian teaching hospital.<sup>19</sup> However, in a study investigating RNs' time in a telemetry unit of a rural community medical centre in the US, RNs self-reported that documentation was the most time-consuming activity and that it consumed more time than medication administration in a day shift.<sup>20</sup>

As for the RN, in the present study the EENs also spent more time on medication administration than documentation. This finding is in contrast to that reported in a previous work sampling study that was also conducted in an Australian RAC home in morning shifts.<sup>6</sup> This difference may be due to the different data collection methods used.

The proportion of time spent by the RN on medication administration (28.8%) was higher than that found in previous studies (16.9%–21.1%).<sup>6,19,20</sup>

In the present study, most morning shifts were done by the EENs. The proportion of time they spent on medication administration (25.6%) was higher than that reported previously (17.8%),<sup>6</sup> whereas the time spent on documentation in the present study was much lower than that reported previously<sup>6</sup> (17.9% vs 29%). A time–motion study conducted in an Australian public hospital found that enrolled nurses spent approximately 5% of their time on medication-related tasks but 9%–22% on documentation.<sup>21</sup>

Although electronic medication administration records were used in Unit 1 and paper-based records were used in Unit 2, no significant difference between the two units was found in the proportion of time nurses spent on documentation.

The RN spent significantly more time on documentation than the EENs. This may be because the day of observation was the first day of the week that the RN had worked in that unit and consequently she may have needed more time to read medication administration records. This may also explain why the proportion of time the RN spent on documentation activities (26.6%) was higher than the 17.7% reported by Munyisia *et al.*<sup>6</sup>

Similar to the findings of previous studies in RAC homes<sup>22</sup> and hospitals,<sup>19,23,24</sup> verbal communication occupied an even higher proportion of nursing time than medication administration, indicating the importance of this activity in care provision. The present study found that verbal communication was largely comprised of pure verbal communication, significantly longer than concurrent verbal communication with other activities. This may reflect the high level of concentration that is required by the staff in providing nursing care. When talking to other people in this process, nursing staff often stopped what they were doing.

Concurrent verbal communication was also investigated in a work sampling study of an RAC home.<sup>6</sup> That study found that both RNs and EENs spent more than 38% of their time on concurrent verbal communication, substantially higher than the findings in the present study.

Consistent with previous studies,<sup>6,21,24,25</sup> the time that nurses spent on transit took less than 10% of their time.

The short activity duration may indicate that nursing staff frequently switched between activities. This was also observed by Cornell *et al.*<sup>24</sup> in a hospital. They suggested that the frequent switch may be caused by unpredictable demands from patients or other nursing staff and nursing staff time management strategies. However, these switches may be necessary for nursing staff to complete a task. For example, a nurse may conduct many activities to medicate a resident, such as getting medication from the trolley, crushing tablets, preparing a cup of water and feeding the person. The more activities done, the more switches between activities.

The process diagram shows that more flexible arrangements can be made for wound care, physical review and documentation on desktop computers. Attention can be paid to these nursing tasks, which can be arranged more flexibly, in developing a task reallocation strategy to improve work efficiency. For example, wound care tasks can be further split into morning and afternoon shifts to even out nursing workload.

### Limitations

The number of nursing staff observed in the present study was small. However, they were the staff who regularly worked a majority of morning shifts. Therefore, their work represented the nursing care pattern of the RAC home studied.

Direct observation may have a Hawthorne effect,<sup>26</sup> meaning that nursing staff may change their usual work behaviour in response to being observed. However, the nursing staff were comfortable with being followed and observed by the observer, possibly because they had similar experiences when providing training to nursing students. The Hawthorne effect was also minimised by having the observer conduct the preliminary and pilot study. The nursing staff had already understood the purpose of the study and become familiar with the observer's presence.

### Conclusion

The present study provides useful information about nursing staff work processes and time usage in providing nursing care in an RAC home. Nursing staff have established a common work process to complete their tasks. Medication administration, documentation and verbal communication were the three most time-consuming activities in nursing work and were conducted most frequently. The average duration of most activity categories was less than 1 min.

Further investigation as to how, when and where nursing staff communicate with residents and other staff, as well as the content of these communications, will be useful to gain an understanding of the contribution of verbal communication to care provision.

### Competing interests

The authors declare that they have no competing interests.

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**Appendix I. Total number of observations of each activity and activity duration**

S8, Schedule 8 (drugs of addiction); PEG, percutaneous endoscopic gastrostomy; BGL, blood glucose levels; PRN, as required

Category	Activities	Total no. observations	Duration (s) Mean $\pm$ s.d.
Medication administration	Preparation		
	Preparing a medication trolley (e.g. putting packed medication onto the trolley)	111	61.5 $\pm$ 74.6
	Locating or identifying a resident (e.g. looking for a resident in a dining room, checking whether a resident is ready for medication)	133	7.7 $\pm$ 7.5
	Identifying an S8 drug (e.g. opening the locked cabinet, finding a drug)	4	19.8 $\pm$ 9.7
	Preparing or assisting in the preparation of S8 drugs tablet	2	16.2 $\pm$ 8.2
	Preparing or assisting in the preparation of S8 drugs liquid	2	38.6 $\pm$ 11.7
	Preparing or assisting in the preparation of S8 drugs injection	3	57.3 $\pm$ 22.2
	Preparing or assisting in the preparation of S8 drugs patch	—	—
	Preparing or assisting in the preparation of S8 drugs via PEG feeding tubes	—	—
	Identifying an ordinary medication from the trolley	727	11.8 $\pm$ 10.2
	Preparing ordinary tablet medication	774	22.8 $\pm$ 19.7
	Preparing liquid medication	52	17.7 $\pm$ 8.4
	Preparing powder medication (e.g. laxative)	167	23.1 $\pm$ 18.4
	Preparing eye drops or ointment	18	7.3 $\pm$ 4.4
	Preparing injection (e.g. vitamin B <sub>12</sub> , insulin)	35	27.2 $\pm$ 13.6
	Preparing puffer or inhaler	38	19.3 $\pm$ 15.0
	Preparing nebuliser	33	21.3 $\pm$ 15.9
	Preparing patch	14	17.1 $\pm$ 12.2
	Preparing topical medication (e.g. cream)	2	37.4 $\pm$ 1.9
	Preparing resource (i.e. nutrition drink)	34	12.1 $\pm$ 8.3
	Preparing for PEG feeding	33	27.0 $\pm$ 21.3
	Preparing a cup of water or juice	125	10.3 $\pm$ 10.9
	Preparing equipment for BGL check	73	19.8 $\pm$ 15.0
	Checking BGL	47	24.1 $\pm$ 17.0
	Bringing prepared medication and other supplies (e.g. tissue) to a resident	477	11.3 $\pm$ 9.1
	Preparing PRN medication	8	37.9 $\pm$ 40.6
	Preparing a resident for medication provision	60	14.8 $\pm$ 11.5
	Provision		
	Providing or assisting in the provision of S8 drugs tablet	3	105.0 $\pm$ 118.3
	Providing or assisting in the provision of S8 drugs liquid	—	—
	Providing or assisting in the provision of S8 drugs injection	1	44.7 $\pm$ —
	Providing or assisting in the provision of S8 drugs patch	2	25.5 $\pm$ 7.6
	Providing or assisting in the provision of S8 drugs via PEG feeding tubes	—	—
	Providing ordinary tablet medication	476	33.0 $\pm$ 32.5
	Providing liquid medication	19	21.9 $\pm$ 29.5
	Providing powder medication (e.g. laxative)	11	33.9 $\pm$ 47.7
	Providing eye drops/ointment	94	19.6 $\pm$ 12.2
	Providing injection (e.g. vitamin B <sub>12</sub> , insulin)	25	16.9 $\pm$ 8.8
	Providing puffer or inhaler	44	15.1 $\pm$ 9.8
	Providing nebuliser	22	22.5 $\pm$ 11.6
	Providing patch	13	16.1 $\pm$ 16.3
	Providing topical medication (e.g. cream)	2	51.4 $\pm$ 48.8
	Providing resource (i.e. nutrition drink)	13	20.6 $\pm$ 16.9
	Providing medications via PEG feeding tubes	19	111.4 $\pm$ 54.8
	Providing a PRN medication	5	39.6 $\pm$ 35.6
	After provision		
	Travelling back to medication trolley	412	5.6 $\pm$ 6.6
	Disposing of clinical waste and general waste, putting medication (e.g. eye drops) back on trolley	508	8.2 $\pm$ 6.8
	Bringing or collecting spoons and cups to or from the wash-up room or washing them	33	38.9 $\pm$ 28.5
Wound care	Preparing wound care trolley	26	36.4 $\pm$ 34.6
	Preparing for wound care (e.g. putting supplies on the trolley, preparing dressing)	121	45.8 $\pm$ 39.0
	Wound care for a resident	143	49.8 $\pm$ 45.2
	Cleaning wound care trolley	41	20.9 $\pm$ 17.6

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## Appendix I. (continued)

Category	Activities	Total no. observations	Duration (s) Mean $\pm$ s.d.
Physical review	Preparing or organising physical review equipment	12	16.1 $\pm$ 13.9
	Physical review for a resident (i.e. assessment)	10	64.5 $\pm$ 40.2
Infection control	Alcohol handwash (medication related)	362	8.0 $\pm$ 14.9
	Alcohol handwash (non-medication related)	71	11.6 $\pm$ 14.1
	Water handwash (medication related)	22	22.9 $\pm$ 12.1
	Water handwash (non-medication related)	33	29.0 $\pm$ 26.2
	Putting on/taking off gloves (medication related)	180	10.1 $\pm$ 7.5
	Putting on/taking off gloves (non-medication related)	122	14.1 $\pm$ 14.2
Verbal communication	Pure verbal communication		
	Verbal communication with a resident (medication related)	433	13.1 $\pm$ 16.8
	Verbal communication with a resident (non-medication related)	1077	19.2 $\pm$ 72.1
	Verbal communication with another nurse (medication related)	61	60.0 $\pm$ 162.9
	Verbal communication with another nurse (non-medication related)	261	51.2 $\pm$ 78.1
	Verbal communication with a personal carer (medication related)	20	18.1 $\pm$ 11.7
	Verbal communication with a personal carer (non-medication related)	359	24.6 $\pm$ 34.4
	Verbal communication with other internal staff (e.g. physiotherapist; medication related)	1	0.7
	Verbal communication with other internal staff (e.g. physiotherapist; non-medication related)	56	20.1 $\pm$ 18.3
	Verbal communication with an external health professional (e.g. doctor; medication related)	—	—
	Verbal communication with an external health professional (e.g. doctor; non-medication related)	7	43.3 $\pm$ 46.1
	Verbal communication with a visitor (medication related)	6	22.4 $\pm$ 17.4
	Verbal communication with a visitor (non-medication related)	94	40.8 $\pm$ 63.6
	Receiving, answering or making a phone call (to other staff, doctor, pharmacy etc.; medication related)	4	32.0 $\pm$ 19.2
	Receiving, answering or making a phone call (to other staff, doctor, pharmacy etc.; non-medication related)	54	44.4 $\pm$ 50.3
	Shift handover	26	592.3 $\pm$ 420.0
	Concurrent verbal communication		
	Verbal communication with a resident (medication related)	187	11.6 $\pm$ 19.3
	Verbal communication with a resident (non-medication related)	481	19.1 $\pm$ 34.1
	Verbal communication with another nurse (medication related)	10	54.3 $\pm$ 88.0
	Verbal communication with another nurse (non-medication related)	56	17.5 $\pm$ 25.5
	Verbal communication with a personal carer (medication related)	3	7.5 $\pm$ 5.7
	Verbal communication with a personal carer (non-medication related)	145	17.4 $\pm$ 46.7
	Verbal communication with other internal staff (e.g. physiotherapist; medication related)	—	—
	Verbal communication with other internal staff (e.g. physiotherapist; non-medication related)	30	7.7 $\pm$ 9.9
	Verbal communication with an external health professional (e.g. doctor; medication related)	—	—
	Verbal communication with an external health professional (e.g. doctor; non-medication related)	1	3.6 $\pm$ .
	Verbal communication with a visitor (medication related)		
	Verbal communication with a visitor (non-medication related)	23	10.3 $\pm$ 12.0
	Receiving, answering or making a phone call (to other staff, doctor, pharmacy etc.; medication related)	—	—
	Receiving, answering or making a phone call (to other staff, doctor, pharmacy etc.; non-medication related)	4	10.9 $\pm$ 13.9
	Shift handover	—	—
Documentation	Paper-based documentation		
	Collecting or putting a documentation book from or back to a filing area	42	24.5 $\pm$ 27.3
	Flipping an S8 drug documentation book	34	3.1 $\pm$ 2.5
	Reading an S8 drug documentation book	4	2.9 $\pm$ 1.2
	Writing in an S8 drug documentation book	45	20.2 $\pm$ 12.6
	Flipping medication administration records	519	10.2 $\pm$ 9.4
	Reading medication administration records	106	8.8 $\pm$ 7.7

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**Appendix I.** (continued)

Category	Activities	Total no. observations	Duration (s) Mean $\pm$ s.d.
	Writing in medication administration records	450	11.7 $\pm$ 9.8
	Reading a daily medication orders	1	22.7
	Writing on a daily medication orders	3	8.7 $\pm$ 6.8
	Reading/writing on a paper note, handover sheet	243	21.4 $\pm$ 23.9
	Flipping a wound care book or form	112	19.1 $\pm$ 17.6
	Reading a wound care book or form	127	18.2 $\pm$ 16.7
	Writing in a wound care book or form	123	40.8 $\pm$ 71.8
	Flipping a physical review book or form	5	6.2 $\pm$ 5.5
	Reading a physical review book or form	5	11.4 $\pm$ 12.9
	Writing in a physical review book or form	18	29.9 $\pm$ 26.5
	Flipping other documentation books (e.g. diary)	39	15.7 $\pm$ 16.5
	Reading other documentation books (e.g. diary)	21	45.3 $\pm$ 55.7
	Writing in other documentation books (e.g. diary)	53	30.9 $\pm$ 43.7
	Filing a document in a filing tray or filing book	12	37.8 $\pm$ 34.4
	Electronic documentation		
	Portable device		
	Logging in/out of the electronic system	24	23.7 $\pm$ 22.3
	Locating a resident's record in the electronic system on the portable device (medication related)	392	7.2 $\pm$ 6.0
	Locating a resident's record in the electronic system on the portable device (non-medication related)	11	7.4 $\pm$ 11.4
	Reading in the electronic system on the portable device (medication related)	24	7.8 $\pm$ 7.9
	Reading in the electronic system on the portable device (non-medication related)	1	8.5
	Ticking or entering medication-related information in the electronic system on the portable device	418	8.9 $\pm$ 10.4
	Non-medication-related activities in the electronic system on the portable device	10	14.9 $\pm$ 5.4
	Desktop computer		
	Logging in or out of a desktop computer	23	12.1 $\pm$ 13.6
	Logging in or out of the electronic system on a desktop computer	55	23.0 $\pm$ 24.8
	Locating a form in the electronic system on a desktop computer (medication related)	11	10.4 $\pm$ 15.5
	Locating a form in the electronic system on a desktop computer (non-medication related)	258	24.6 $\pm$ 23.1
	Reading data in the electronic system on a desktop computer (medication related)	1	65.8
	Reading data in the electronic system on a desktop computer (non-medication related)	40	23.2 $\pm$ 33.7
	Entering data in the electronic system on a desktop computer (medication related)	8	28.9 $\pm$ 64.3
	Entering data in the electronic system on a desktop computer (non-medication related)	227	62.3 $\pm$ 53.2
Print and fax	Preparing a fax cover sheet (either typed on a computer or handwritten on a piece of paper)	1	86.4
	Faxing documents (e.g. stamping 'faxed' on a faxed document, filing a faxed document)	3	103.9 $\pm$ 92.3
	Printing or photocopying a document (e.g. form for transferring a resident to hospital)	25	38.0 $\pm$ 40.1
Transit	Pushing a medication trolley	576	18.5 $\pm$ 12.9
	Pushing other trolley or pulling a trailer (e.g. wound care trolley)	125	22.9 $\pm$ 15.4
	Walking or standing in the corridor, dining room etc.	357	26.7 $\pm$ 28.8
Staff breaks	Staff breaks (e.g. lunch break)	34	455.3 $\pm$ 630.8
Other	Other activities not included above (e.g. turning on a TV for a resident, opening curtains)	270	69.4 $\pm$ 136.1