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

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

### 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.

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**Title:** Nursing staff work patterns in a residential aged care home: A time-motion study

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## **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. This study aimed 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.** Ninety-one hours of observation were made. 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 the majority of activities was less than one minute. 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.

**Keywords:** Activity; Long-term care; Nursing home; Pattern, Process, Time; Workflow

**What is known about the topic?** The ageing 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?** This study provides a comprehensive understanding of nurses' work patterns in 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 re-allocation strategy to improve work efficiency, effort can be put into tasks that can be arranged more flexibly.

## 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 of 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 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 nursing staff's time spent on these activities,<sup>3-10</sup> with a couple described personal carers' (PCs) work processes in conducting specific activities (e.g. bathing, oral care).<sup>7,9</sup>

Studies investigating nursing care activities mostly focused 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. They 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 nurses' time spent on each of the pre-defined seven steps in medication administration in a single

RAC home. They found that medication preparation and provision required longer time than any other steps.<sup>14</sup>

One study described wound care and its documentation processes in an Australian RAC home.<sup>17</sup> It 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.

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, this study aimed 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: preliminary study, pilot study and data collection. The preliminary study was aimed at developing a classification of nursing staff activities to be used in time-motion observations. The pilot study tested the feasibility of the data collection tool. It also enabled the observer to gain proficiency in observation using the activity classification system.

Afterwards, 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 prior to the commencement of this study. Interrater reliability was not assessed because only one observer (SQ) was used.<sup>14</sup>

### **The preliminary study**

The preliminary study was conducted in five morning shifts (6:30 a.m. to 3 p.m.) at three units of an RAC home and one unit of another RAC home. 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 whole morning shift. The observer recorded everything the person did in detail, such as flipping paper-based records, crushing tablets and preparing a cup of water. One-hundred and eighty-four activities were recorded.

These activities were then entered into an Excel spreadsheet for grouping. The grouping was carried out in discussion with an RN who had extensive experience working and researching in RAC. This led to a classification system of 116 activities grouped into ten 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 the activities. Table 1 shows the resultant classification system of nurses' activities. A full description of activities can be found in the appendix.

### **The 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: iPad, iPod touch and a Windows tablet. The iPad was considered the optimal available tool for data collection.

The other six days were spent by the observer on practising using the iPad to conduct time-motion observation. A commercial software InMotion Pro<sup>18</sup> was installed on the iPad to record time-motion data in appropriating its functions of recording the start and end time and the duration of an activity when the observer hit the activity button on the touchscreen. The start of a new activity indicates the end of a previous activity. On each day, one nurse was randomly selected for observation. If the person gave consent, the observer followed this person continuously throughout a morning shift.

### **The formal data collection**

#### ***Setting***

The formal data collection was conducted in two units of an RAC home which were next to each other. Ninety-seven percent of residents in these units required a high level of care. Their average age 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. No residents in Unit 2 had this need.

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

These nursing staff did not administer Schedule 8 drugs<sup>19</sup> (drugs of addiction), however 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 this type of drugs in both units together with another nursing staff member. This RN also had other duties, such as 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 tasks in morning shifts. Their work activities were representative of those in the two units. They were one RN, four EENs and two PCs. All of them provided nursing care to residents. They did not administer Schedule 8 drugs, but sometimes assisted with the administration. The RN observed was a different one from the RN who administered Schedule 8 drugs.

Their average years of work experience in medication administration were six years. Five of them had more than seven years of experience, with the longest being 13 years.

The RN was observed in Unit 1. The PCs 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 change in staff roster, availability of the observer and study timeframe.

### ***Observation***

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

## **Data analysis**

Content validity ratio was calculated using the formula:  $(n_e - N/2) / (N/2)$ , where 'n<sub>e</sub>' 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 the p value was less than 0.05 for comparing the two units and less than 0.016 for comparing the three types of nursing staff.

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

## **Results**

### **A common work process of nursing staff in morning shifts**

Figure 1 illustrates 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. The nurse did documentation at the point-of-care and also after care provision. If the nurse had time, he or she would do 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**

Ninety-one hours of work were observed. More than 70% of nursing staff's time was spent on verbal communication, medication administration and documentation. As shown in Table

2, at both units, verbal communication took the biggest proportion of nursing staff's time, with pure verbal communication as 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 categories of 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 more than it was at Unit 2. The concurrent verbal communication means a nurse was talking while undertaking another activity at the same time.

As 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 eight-hour shift, nursing staff spent less than an hour on staff breaks, half an hour on transit activities, 20 minutes on wound care and 12 minutes on infection control activities. They spent the least amount of time on physical review, print and fax.

### **Activity duration**

As shown in Table 2, except staff breaks and other, the average duration of each activity category was less than one minute. The duration of each activity can be found in the appendix.

### **Activity frequency**

A total of 14,073 activities were recorded, 7,012 at Unit 1 and 7,061 at Unit 2. Figure 2 shows the average number of occurrences of each activity in each hour during a morning shift. The most frequently conducted activities, medication administration, verbal communication

and documentation, followed similar patterns over time, peaking between 7 a.m. and 9 a.m., and again between 12 p.m. and 1 p.m. Wound care was done mainly between 10 a.m. and 12 p.m. The number of infection control and transit activities fluctuated slightly over time.

### **Differences among three types of nurses**

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

### **Discussion**

This study adds to the knowledge of nursing staff work processes and the time, frequency and duration they used to conduct work activities in RAC homes. The results show that there were certain work patterns that all the nurse participants followed to complete nursing tasks in morning shifts in an RAC home. The classification system of activities developed in this study is useful for researchers and practitioners in conducting similar studies in RAC homes.

The findings of this study show that the RN spent more time on medication administration than on documentation. This result is the same as a previous study that used work sampling method to collect data in an Australian high-care home,<sup>6</sup> as well as those at an Australian teaching hospital.<sup>20</sup> However, in a study investigating RNs' time in a telemetry unit of a rural community medical centre in the USA, 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>21</sup>

Same to the RN, this study found that the EENs also spent more time on medication administration than documentation. This is opposite to a previous work sampling study which 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 those found by previous studies (16.9% to 21.1%).<sup>6, 20, 21</sup>

In our study, most morning shifts were done by the EENs. The proportion of time they spent on medication administration (25.6%) was higher than the 17.8% found by a previous study,<sup>6</sup> while the time spent on documentation in this study was much lower (17.9% vs 29%) than that found in that study. A time-motion study conducted in an Australian public hospital found that enrolled nurses spent about 5% of their time on medication-related tasks but 9-22% on documentation.<sup>22</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 might be because that it was the first day of the week that the RN worked in that unit. She might need 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% as measured by Munyisia et al.<sup>6</sup>

Similar to the findings of previous studies in RAC homes<sup>23</sup> and hospitals,<sup>20, 24, 25</sup> verbal communication occupied an even higher proportion of nursing time than medication administration, indicating the importance of this activity in care provision. This 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> The study found that both RNs and EENs spent more than 38% of their time on concurrent verbal communication, substantially higher than our finding.

Consistent with the previous studies,<sup>6, 22, 25, 26</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>25</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 that can be arranged more flexibly, in developing a task re-allocation strategy to improve work efficiency. For example, wound care tasks can be further split into morning shift and afternoon shift to even out nursing workload.

## **Limitations**

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

Direct observation may cause the Hawthorne effect<sup>27</sup> which means nursing staff may change their usual work behaviour in response to being observed. However, it was found that the nursing staff was comfortable with being followed and observed by the observer, possibly because they had a similar experience in 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 familiarised themselves with the presence of the observer.

## **Conclusion**

This study gives 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 one minute.

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.

## **Acknowledgement**

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### **Competing interests**

The authors declare that they have no competing interests.

### **Authors' contributions**

SQ and PY conceptualised and designed the study. SQ collected and analysed data. SQ drafted the manuscript. PY and DH revised the manuscript critically for important intellectual content. All authors read and approved the final manuscript.

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

<b>Categories</b>	<b>Activities</b>
<b>Medication administration</b>	<b>Preparation</b>
	preparing a medication trolley (e.g. get spoons, cups, medication administration records, refrigerated medication, a rubbish bag for general waste)
	locating or identifying a resident (e.g. look for a resident in a dining room, check if a resident is ready for medication)
	identifying/preparing/assisting preparation of S8 drugs (Schedule 8 drugs of addiction)
	identifying/preparing an ordinary medication tablet/liquid/powder/eye drops/ointment/injection/puffer/ using PEG feeding tubes, etc.
	preparing equipment for BGL (blood glucose level) checking/checking BGL
	bringing prepared medication and other supplies (e.g. tissue) to a resident
	preparing PRN medication
	preparing a resident for medication provision
	<b>Provision</b>
	providing/assisting provision of S8 drugs tablet/liquid/injection/patch/using PEG feeding tubes
	providing ordinary medication tablet/liquid/powder/eye drops/ointment/injection/puffer/ using PEG feeding tubes, etc.
	providing a PRN medication
	<b>After provision</b>
	travelling back to medication trolley
	disposing clinical waste and general waste/put medication (e.g. eye drops) back on to trolley
bringing/collecting spoons and cups to/from the wash up room or washing them	
<b>Wound care</b>	preparing/cleaning wound care trolley
	preparing/caring for wound care
<b>Physical review</b>	preparing/organising physical review equipment (e.g. a blood pressure monitor)
	physical review for a resident
<b>Infection control</b>	alcohol handwash/water handwash/putting on/taking off gloves (medication-related)
	alcohol handwash/water handwash/putting on/taking off gloves (non-medication-related)
<b>Verbal communication</b>	verbal communication with a resident/nurse/personal carer/other internal staff/external health professional/visitor (medication-related)
	verbal communication with a resident/nurse/personal carer/other internal staff/external health professional/visitor (non-medication-related)
	receiving/answering/making a phone call (to another staff, doctor, pharmacy, etc.)(medication-related)
	receiving/answering/making a phone call (to another staff, doctor, pharmacy, etc.)(non-medication-related)
	shift handover
<b>Documentation</b>	<b>Paper-based documentation</b>
	collecting/putting a documentation book from/back to a filing area
	flipping/reading/writing an S8 drug documentation book
	flipping/reading/writing medication administration records
	reading/writing on daily medication orders
	reading/writing on a paper note, handover sheet
	flipping/reading/writing a wound care book/form
	flipping/reading/writing a physical review book/form
	flipping/reading/writing other documentation books (e.g. diary)
	filing a document in a filing tray or filing book
	<b>Electronic documentation</b>

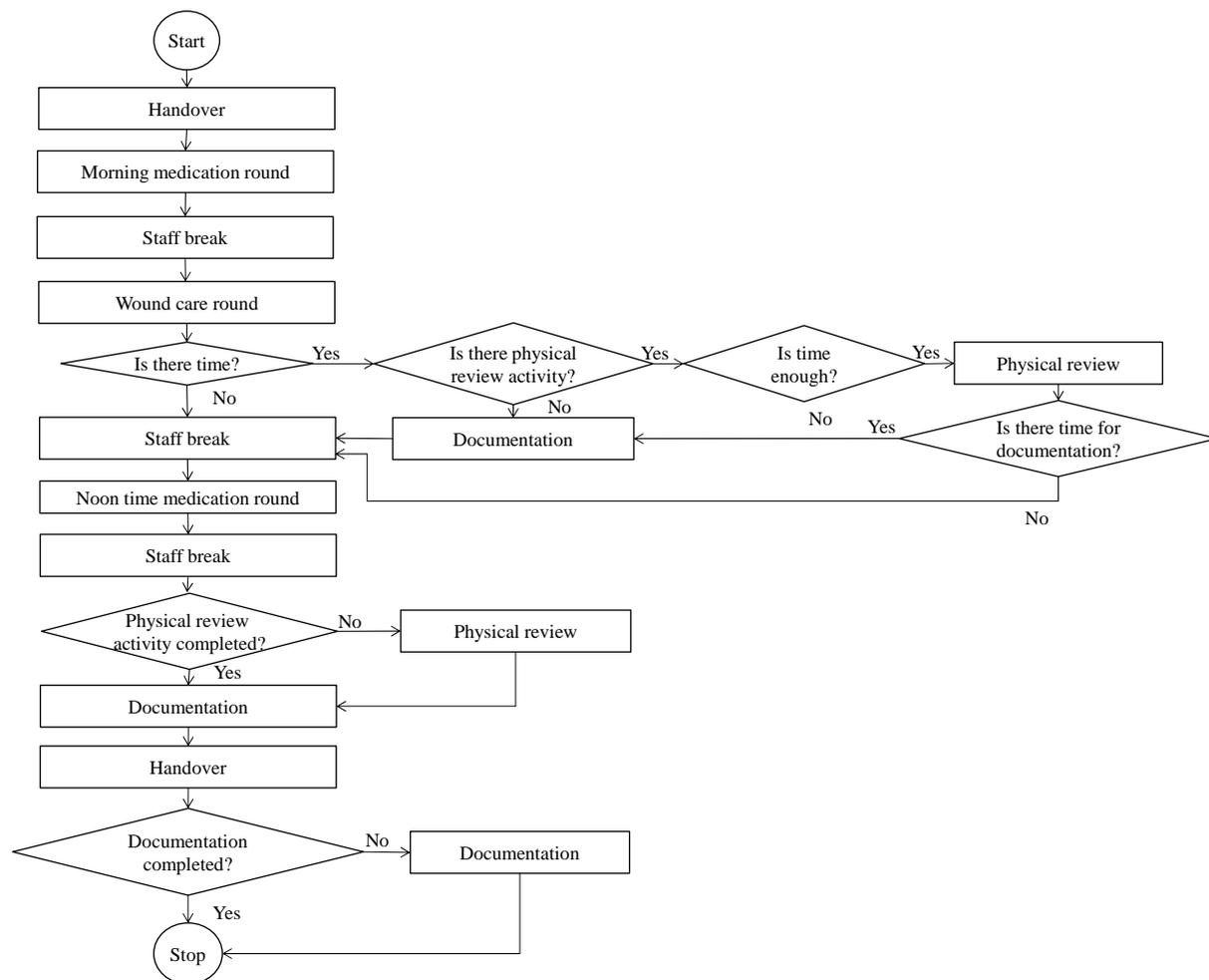
	<b>Portable device</b>
	logging in/out the electronic system
	locating/ reading/entering a resident's record in the electronic system on the portable device (medication-related)
	locating/ reading/entering a resident's record in the electronic system on the portable device(non-medication-related)
	non-medication-related activities in the electronic system on the portable device
	<b>Desktop computer</b>
	logging in/out of a desktop computer or the electronic system
	locating a form/reading/entering data in the electronic system on a desktop computer (medication-related)
	locating a form/reading/entering data in the electronic system on a desktop computer (non-medication-related)
<b>Print and fax</b>	preparing a fax cover sheet (either type on computer or handwrite on a piece of paper)
	faxing documents (e.g. stamp "faxed" on a faxed document, file a faxed document)
	printing/photocopying a document (e.g. form for transferring a resident to hospital )
<b>Transit</b>	pushing a medication trolley
	pushing other trolley or pulling a trailer (e.g. wound care trolley)
	walking/standing in corridor, dining room, etc.
<b>Staff breaks</b>	staff breaks (e.g. lunch break)
<b>Other</b>	other activities not included above

A full list of activities can be found in the appendix.

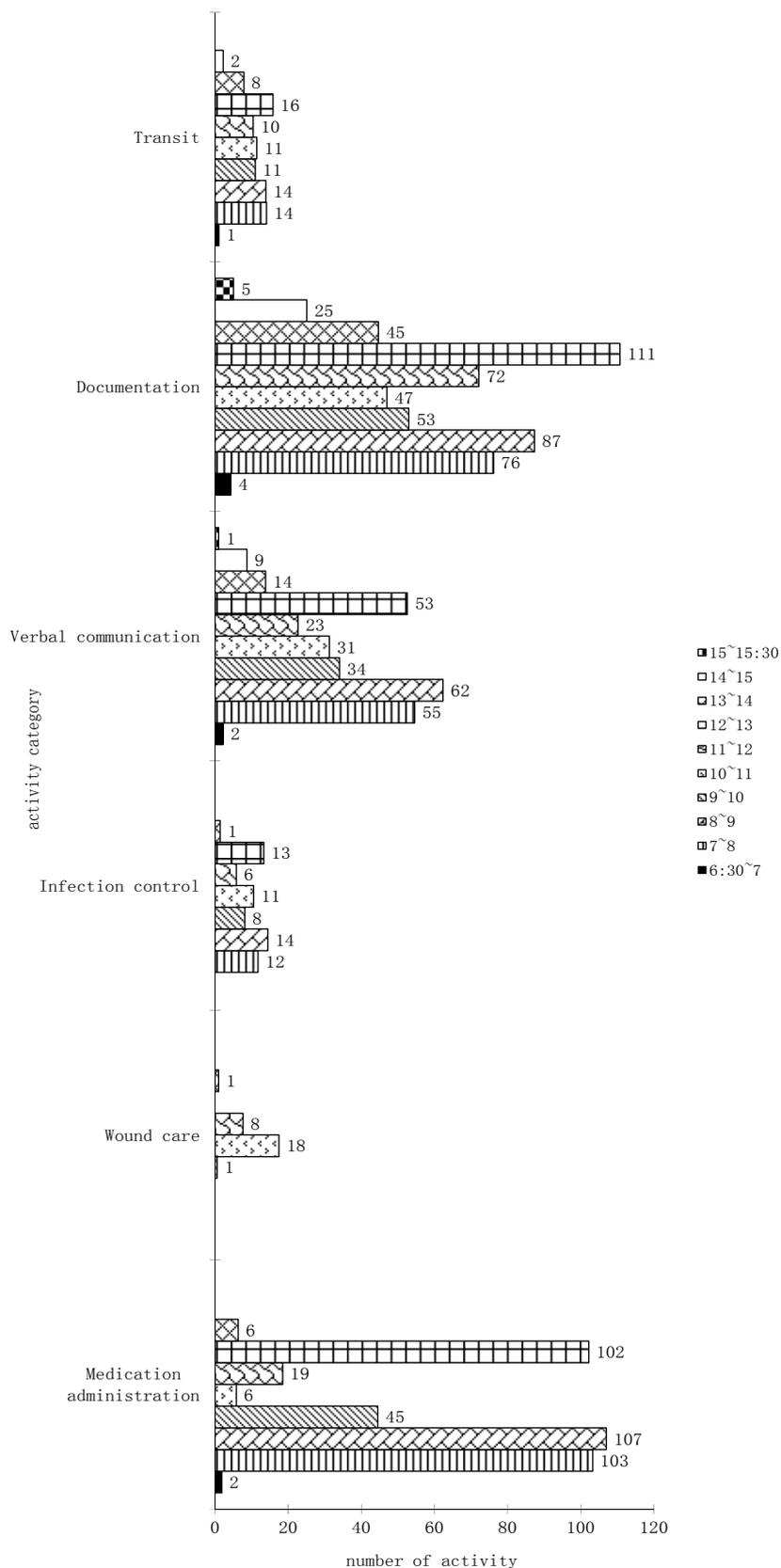
**Table 2. Nursing staff's time spent on each category of activities.**

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

CI: confidence interval, SD: standard deviation

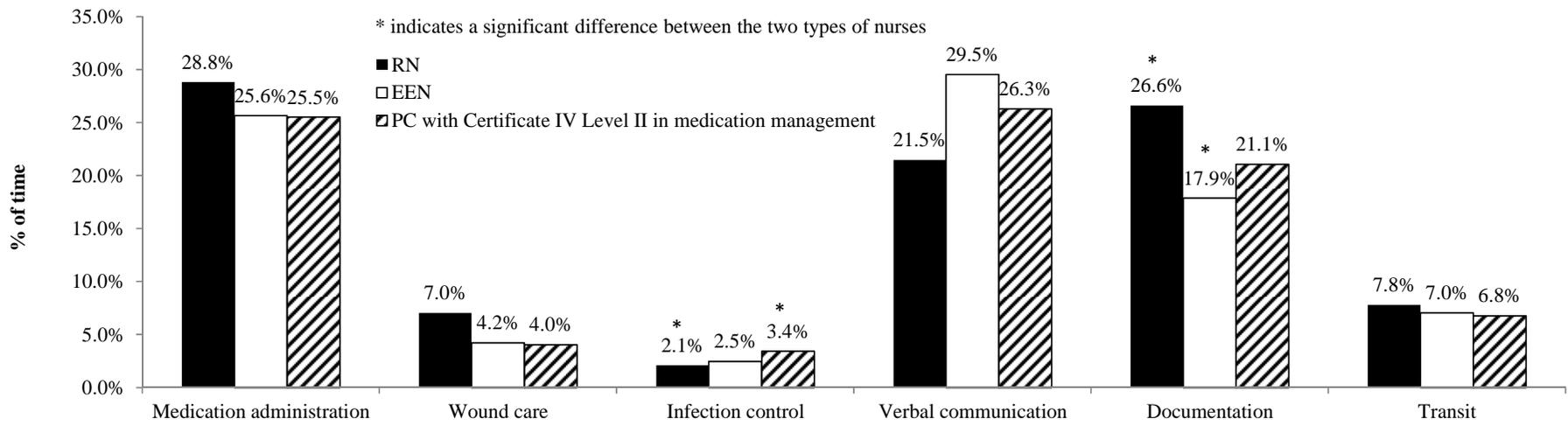


**Figure 1. Common work process of nursing staff in morning shifts.**



**Figure 2. Number of occurrences of main activity category in each hour over an 8-h morning shift from 6:30 a.m. to 3:30 p.m.**

1



2

3

**Figure 3. Time expenditure on main activities by different types of nurses.**

4

**Appendix. The total number of observations of each activity and activity duration.**

Categories	Activities	N	Duration (s)	
			Mean	SD
Medication administration	<b>Preparation</b>			
	preparing a medication trolley (e.g. put packed medication on to the trolley)	111	61.5	74.6
	locating or identifying a resident (e.g. look for a resident in a dining room, check if a resident is ready for medication)	133	7.7	7.5
	identifying an S8 drug (Schedule 8 drugs of addiction) (e.g. open the locked cabinet, find a drug)	4	19.8	9.7
	preparing/assisting preparation of S8 drugs tablet	2	16.2	8.2
	preparing/assisting preparation of S8 drugs liquid	2	38.6	11.7
	preparing/assisting preparation of S8 drugs injection	3	57.3	22.2
	preparing/assisting preparation of S8 drugs patch	-	-	-
	preparing/assisting preparation of S8 drugs via PEG (percutaneous endoscopic gastrostomy) feeding tubes	-	-	-
	identifying an ordinary medication from the trolley	727	11.8	10.2
	preparing ordinary tablet medication	774	22.8	19.7
	preparing liquid medication	52	17.7	8.4
	preparing powder medication (e.g. movicol)	167	23.1	18.4
	preparing eye drops/ointment	18	7.3	4.4
	preparing injection (e.g. B12, insulin)	35	27.2	13.6
	preparing puffer/inhaler	38	19.3	15.0
	preparing nebuliser	33	21.3	15.9
	preparing patch	14	17.1	12.2
	preparing topical medication (e.g. cream)	2	37.4	1.9
	preparing resource (i.e. nutrition drink)	34	12.1	8.3
	preparing for PEG feeding	33	27.0	21.3
	preparing a cup of water/juice	125	10.3	10.9
	preparing equipment for BGL (blood glucose level) checking	73	19.8	15.0
	checking BGL	47	24.1	17.0
	bringing prepared medication and other supplies (e.g. tissue) to a resident	477	11.3	9.1
	preparing PRN medication	8	37.9	40.6
	preparing a resident for medication provision	60	14.8	11.5
	<b>Provision</b>			
	providing/assisting provision of S8 drugs tablet	3	105.0	118.3
	providing/assisting provision of S8 drugs liquid	-	-	-
	providing/assisting provision of S8 drugs injection	1	44.7	-
	providing/assisting provision of S8 drugs patch	2	25.5	7.6
	providing/assisting provision of S8 drugs via PEG feeding tubes	-	-	-
	providing ordinary tablet medication	476	33.0	32.5
providing liquid medication	19	21.9	29.5	
providing powder medication (e.g. movicol)	11	33.9	47.7	
providing eye drops/ointment	94	19.6	12.2	
providing injection (e.g. B12, insulin)	25	16.9	8.8	

	providing puffer/inhaler	44	15.1	9.8
	providing nebuliser	22	22.5	11.6
	providing patch	13	16.1	16.3
	providing topical medication (e.g. cream)	2	51.4	48.8
	providing resource (i.e. nutrition drink)	13	20.6	16.9
	providing medications via PEG feeding tubes	19	111.4	54.8
	providing a PRN medication	5	39.6	35.6
	<b>After provision</b>			
	travelling back to medication trolley	412	5.6	6.6
	disposing clinical waste and general waste/put medication (e.g. eye drops) back on to trolley	508	8.2	6.8
	bringing/collecting spoons and cups to/from the wash up room or washing them	33	38.9	28.5
<b>Wound care</b>	preparing wound care trolley	26	36.4	34.6
	preparing for wound care (e.g. put supplies on to the trolley, prepare dressing)	121	45.8	39.0
	wound care for a resident	143	49.8	45.2
	cleaning wound care trolley	41	20.9	17.6
<b>Physical review</b>	preparing/organising physical review equipment	12	16.1	13.9
	physical review for a resident (i.e. assessment)	10	64.5	40.2
<b>Infection control</b>	alcohol handwash (medication-related)	362	8.0	14.9
	alcohol handwash (non-medication-related)	71	11.6	14.1
	water handwash (medication-related)	22	22.9	12.1
	water handwash (non-medication-related)	33	29.0	26.2
	putting on/taking off gloves (medication-related)	180	10.1	7.5
	putting on/taking off gloves (non-medication-related)	122	14.1	14.2
<b>Verbal communication</b>	<b>Pure verbal communication</b>			
	verbal communication with a resident (medication-related)	433	13.1	16.8
	verbal communication with a resident (non-medication-related)	1077	19.2	72.1
	verbal communication with another nurse (medication-related)	61	60.0	162.9
	verbal communication with another nurse (non-medication-related)	261	51.2	78.1
	verbal communication with a personal carer (medication-related)	20	18.1	11.7
	verbal communication with a personal carer (non-medication-related)	359	24.6	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	18.3
	verbal communication with an external health professional (e.g. a doctor) (medication-related)	-	-	-
	verbal communication with an external health professional (e.g. a doctor) (non-medication-related)	7	43.3	46.1
	verbal communication with a visitor (medication-related)	6	22.4	17.4
	verbal communication with a visitor (non-medication-related)	94	40.8	63.6
	receiving/answering/making a phone call (to another staff, doctor, pharmacy, etc.)(medication-related)	4	32.0	19.2
	receiving/answering/making a phone call (to another staff, doctor, pharmacy, etc.)(non-medication-related)	54	44.4	50.3
	shift handover	26	592.3	420.0

	<b>Concurrent verbal communication</b>			
	verbal communication with a resident (medication-related)	187	11.6	19.3
	verbal communication with a resident (non-medication-related)	481	19.1	34.1
	verbal communication with another nurse (medication-related)	10	54.3	88.0
	verbal communication with another nurse (non-medication-related)	56	17.5	25.5
	verbal communication with a personal carer (medication-related)	3	7.5	5.7
	verbal communication with a personal carer (non-medication-related)	145	17.4	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	9.9
	verbal communication with an external health professional (e.g. a doctor) (medication-related)	-	-	-
	verbal communication with an external health professional (e.g. a doctor) (non-medication-related)	1	3.6	.
	verbal communication with a visitor (medication-related)			
	verbal communication with a visitor (non-medication-related)	23	10.3	12.0
	receiving/answering/making a phone call (to another staff, doctor, pharmacy, etc.)(medication-related)	-	-	-
	receiving/answering/making a phone call (to another staff, doctor, pharmacy, etc.)(non-medication-related)	4	10.9	13.9
	shift handover	-	-	-
	<b>Paper-based documentation</b>			
	collecting/putting a documentation book from/back to a filing area	42	24.5	27.3
	flipping an S8 drug documentation book	34	3.1	2.5
	reading an S8 drug documentation book	4	2.9	1.2
	writing in an S8 drug documentation book	45	20.2	12.6
	flipping medication administration records	519	10.2	9.4
	reading medication administration records	106	8.8	7.7
	writing in medication administration records	450	11.7	9.8
	reading a daily medication orders	1	22.7	-
	writing on a daily medication orders	3	8.7	6.8
	reading/writing on a paper note, handover sheet	243	21.4	23.9
	flipping a wound care book/form	112	19.1	17.6
	reading a wound care book/form	127	18.2	16.7
	writing in a wound care book/form	123	40.8	71.8
	flipping a physical review book/form	5	6.2	5.5
	reading a physical review book/form	5	11.4	12.9
	writing in a physical review book/form	18	29.9	26.5
	flipping other documentation books (e.g. diary)	39	15.7	16.5
	reading other documentation books (e.g. diary)	21	45.3	55.7
	writing in other documentation books (e.g. diary)	53	30.9	43.7
	filing a document in a filing tray or filing book	12	37.8	34.4
	<b>Electronic documentation</b>			
	<b>Portable device</b>			
	logging in/out of the electronic system	24	23.7	22.3
	locating a resident's record in the electronic system on the portable device (medication-related)	392	7.2	6.0
<b>Documentation</b>				

	locating a resident's record in the electronic system on the portable device(non-medication-related)	11	7.4	11.4
	reading in the electronic system on the portable device(medication-related)	24	7.8	7.9
	reading in the electronic system on the portable device (non-medication-related)	1	8.5	-
	ticking/entering medication-related information in the electronic system on the portable device	418	8.9	10.4
	non-medication-related activities in the electronic system on the portable device	10	14.9	5.4
	<b>Desktop computer</b>			
	logging in/out a desktop computer	23	12.1	13.6
	login/out the electronic system on a desktop computer	55	23.0	24.8
	locating a form in the electronic system on a desktop computer (medication-related)	11	10.4	15.5
	locating a form in the electronic system on a desktop computer (non-medication-related)	258	24.6	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	33.7
	entering data in the electronic system on a desktop computer (medication-related)	8	28.9	64.3
	entering data in the electronic system on a desktop computer (non-medication-related)	227	62.3	53.2
<b>Print and fax</b>	preparing a fax cover sheet (either type on computer or handwrite on a piece of paper)	1	86.4	-
	faxing documents (e.g. stamp "faxed" on a faxed document, file a faxed document)	3	103.9	92.3
	printing/photocopying a document (e.g. form for transferring a resident to hospital )	25	38.0	40.1
<b>Transit</b>	pushing a medication trolley	576	18.5	12.9
	pushing other trolley or pulling a trailer (e.g. wound care trolley)	125	22.9	15.4
	walking/standing in corridor, dining room, etc.	357	26.7	28.8
<b>Staff breaks</b>	staff breaks (e.g. lunch break)	34	455.3	630.8
<b>Other</b>	other activities not included above	270	69.4	136.1

N: total number of observations

SD: standard deviation