Nursing Time Allocation: A Wok Sampling Survey in a Turkish Private Hospital

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Abstract

Background and Objectives: Work sampling is a useful technique to characterize how employees allocate their work time to various activities. Given the value of nurses' time for quality health care delivery, characterization of nursing time distribution may provide useful information for optimal use of nursing staff. The purpose of the present study was to explore time allocation by nurses using work sampling method.

Methods: The study was conducted in a 150-bed private hospital. Data was collected using a researcher-designed work-sampling tool addressing 259 tasks grouped into four high-level activities, including direct care, indirect care, and unit-related, and personal activities. By conducting a pilot study, a sample size of 669 was determined for observation. In practice, however, a total of 228 nurses were observed in 540 shifts, which provided a robust sample for data analysis. Data were collected at 20–30-minute intervals over a 9-week period. The nurses' activities were randomly observed and recorded by 12 trained observers.

Findings: A total of 17,517 nursing activities were observed for the day shifts and 12,902 for the night shifts. The nurses were found to spend 44%–46% of their work time on direct care, 20%–22% on indirect care, 10%–14% on unit-related duties, and 20%–24% on the personal activities, depending on shift time. The proportion of nursing time specified to direct patient care was the highest in the emergency department (55%, day shift, 57%, night shift) and the lowest in maternity ward (35%, day shift, 32%, night shift). Administration of medication (28.7%, day shift, 28.4%, day shift) and monitoring patients' vital signs (25.6%, day shift, 26.7, night shift) were identified as the most time-intensive patient care tasks. The nursing time distribution was virtually the same in the day and night shifts. The proportion of time spent on personal issued (22%, day shift, 25%, night shift) was found to be higher than that required by the hospital.

Conclusions: While the nursing staff spends the majority of work time on direct patient care, the time spent on personal activities is relatively high, requiring specific inspection. Our results identify the most time-intensive nursing tasks and provide potentially useful data for optimal design of nursing schedule.

Keywords: Work sampling, Nursing staff, Patient care, Healthcare human resources, Hospital management

Background and Objectives

Nursing staff is one of the most crucial resources in health care system. While the number of nurses in the health industry is already insufficient, the present nursing staff is not used effectively and efficiently.¹ Nurses often have to spend significant time for activities such as ward rounds, addressing problems related to insufficient drugs, medicines, medical equipment, and clinical documentation, beside focusing on the direct patient care activities, which is their central duty. Moreover, nurses are subject to frequent interruptions in their workplace.¹ The chaotic work situation faced by nurses in their workplace requires systems and holistic analysis to enable efficient schedule design and remove inefficiency factors.

Work sampling is a statistical technique often used to analyze the time spent by nursing staff on various activities such as direct and indirect patient care, ward-related activities, and personal (non-productive) activities.¹⁴ Previous studies have confirmed the reliability of this method to yield a picture of time allocation by nurses in their workplace.¹⁵,⁶ The present study was aimed at exploiting this method to explore distribution of nurses' time in a well-managed and well-equipped Turkish hospital.

Methods

Setting

The study was carried out in a 150-bed private hospital
in Ankara, the Capital of Turkey. The data was collected over a four-month period from seven out of 8 clinical units, including 7 medical/surgical wards (W1-W4 and W6-W8), neurology ward (W5), maternity ward, and emergency department (Table 1). Intensive care unit (ICU) was excluded for some legal and medical reasons. The data was collected by a trained team of observers. Simultaneous observations were carried out in the wards from 7AM–7PM and 7PM–7AM during all week days, in a period of 130 consecutive days.

Instrument Development
Using nurses’ job descriptions as a draft, a work sampling instrument was developed to follow the work activity of nursing staff. Following a comprehensive literature review and a series of discussion meetings with nursing administrators, the draft tool was extended to a comprehensive list of 259 tasks. Literature review also led us to find it appropriate to group these tasks into four major categories, including direct care, indirect care, unit-related, and personal tasks. The direct nursing care group comprised 212 tasks, which was further categorized into 11 subgroups to simplify the collection and analysis of the data.

Observer Training
We trained 12 newly recruited nurses to perform the observation. The team of observers used a predetermined list of tasks to observe and record the nursing activities at a predefined and randomly selected time intervals. Each time interval was assigned to an observer. According to their assignments, the observers were asked to monitor the activities of the nursing staff.

Pilot Study
Before starting the data collection we conducted a pilot testing to determine the required sample size. Twelve rounds of nursing activity observation were performed at predefined and randomly selected time intervals. The activities of all nurses in each round were recorded. The total proportion of time allocated to direct patient care (47%) was used to calculate the sample size. The sample size was calculated by the formula \( n = \frac{\sqrt{p(1-p)}}{\sigma_p} \), where \( n \) denotes the number of observations; \( p \), the proportion of time allocated to direct patient care; and \( \sigma_p \), the standard error of proportion.\(^{14}\) Based on this formula, the sample size was calculated to be 669 for each ward in each shift.

Data Collection
A total of 228 nurses were observed in 540 shifts, which yield a robust sample size for statistical analysis. Data were collected at 20–30-minute intervals, corresponding to a total of 36 time blocks for a 12-hour shift in the day. All nursing staff that was present on the wards was monitored and the activities of each nurse were recorded at the moment he/she was observed.

Ethical Issues
All nurses who were invited to participate in the study were presented about the study objectives and method and their written consents were obtained. They were also assured that the information on the observed activities of each individual would remain confidential. To prevent Hawthorne effect the participants were also briefed that the study did not seek to evaluate the quality of the work done by the nurses, rather to identify work time distribution among various nursing activities.

Data Analysis
Data were summarized using descriptive statistical methods. The frequency of observations in each activity group was summed up, and the result was divided to the frequency of total activities to yield the proportion of time spent on each activity. All data analyses were carried out in SPSS version 20 software package.

Results
Day Shift Observations
A total of 17 517 day-shift nursing activities were recorded. Table 2 shows the proportion of time allocated to each activity in each ward. As seen, the largest part of nurses’ time is devoted to the direct activities (46%). Indirect and personal activities take the same amount of nurses’ time.

Table 1. Number of Beds, Nurses, and Observations at Each of Clinical Units

<table>
<thead>
<tr>
<th></th>
<th>W1</th>
<th>W2</th>
<th>W3</th>
<th>W4</th>
<th>W5</th>
<th>W6</th>
<th>W7</th>
<th>W8</th>
<th>Maternity Ward</th>
<th>Emergency Department</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of beds</td>
<td>43</td>
<td>21</td>
<td>20</td>
<td>10</td>
<td>16</td>
<td>18</td>
<td>9</td>
<td>10</td>
<td>15</td>
<td>15</td>
</tr>
<tr>
<td>Number of nurses in day shifts</td>
<td>7/8</td>
<td>4/5</td>
<td>3/4</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>Number of nurses in night shifts</td>
<td>5/6</td>
<td>3/4</td>
<td>3/4</td>
<td>1/2</td>
<td>2</td>
<td>2</td>
<td>1/2</td>
<td>1/2</td>
<td>2/3</td>
<td>4/5</td>
</tr>
<tr>
<td>Number of observations in day shifts</td>
<td>3260</td>
<td>1929</td>
<td>1612</td>
<td>1155</td>
<td>1280</td>
<td>1069</td>
<td>1088</td>
<td>996</td>
<td>1639</td>
<td>2663</td>
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<tr>
<td>Number of observations in night shifts</td>
<td>2167</td>
<td>1406</td>
<td>1280</td>
<td>996</td>
<td>1010</td>
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<td>998</td>
<td>992</td>
<td>1114</td>
<td>1944</td>
</tr>
</tbody>
</table>
(20%) standing at the next order. Ultimately, the lowest amount of nurses’ time is taken by unit-relate activities (14%). The percentage of the time spent on direct patient care in the day shift varies within 35%-55%, depending on ward.

Table 3 presents the distribution of nurses’ time over various direct patient care activities. Administration of medication is responsible for the largest part of nurses’ time (28.7%), followed by monitoring patients’ vital signs (25.6%), and communicating with physicians (9.6%). While in the emergency ward, the majority of nurses’ time is spent on administration of medication (45%), in the Maternity ward, the maternity tasks take the largest share of time (30%). In other wards, the largest part of nurses’ time is taken by either administration of medication or monitoring patients’ vital signs.

**Night Shift Observations**

A total of 12902 night-shift nursing activities were recorded. Table 4 shows the proportion of time allocated to each activity in each ward. As seen, the largest part of nurses’ time is devoted to the direct activities (44.2%), followed by indirect patient care (21.6%), and personal activities (24%). The percentage of the time spent on direct nursing care in the night shift varies within 32%-57%, depending on ward.

Table 5 presents the distribution of nurses’ time over various direct patient care activities. Similar to the day shift, in the night shift the medication is responsible for the largest part of nurses’ time (28.4%), followed by monitoring patients’ vital signs (27.7%), and communicating with physicians (10%). While in the emergency ward, the most of nurses’ time is spent on administration of medication (55%), in the Maternity ward, the maternity tasks take the largest fraction of time (30%). In other wards, the largest part of nurses’ time is spent on either administration of medication or monitoring patients’ vital signs.

**Discussion**

**Direct and Indirect Care**

The purpose of this study was to explore the nurse time

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**Table 2. Distribution of Day Shift Nursing Time Among Various Activities at Each Clinical Unit (%)**

<table>
<thead>
<tr>
<th>Activities</th>
<th>W1</th>
<th>W2</th>
<th>W3</th>
<th>W4</th>
<th>W5</th>
<th>W6</th>
<th>W7</th>
<th>W8</th>
<th>Maternity Ward</th>
<th>Emergency</th>
<th>Mean</th>
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</thead>
<tbody>
<tr>
<td>Direct care</td>
<td>51</td>
<td>48</td>
<td>46</td>
<td>40</td>
<td>53</td>
<td>40</td>
<td>43</td>
<td>48</td>
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<td>55</td>
<td>46</td>
</tr>
<tr>
<td>Indirect care</td>
<td>16</td>
<td>19</td>
<td>23</td>
<td>20</td>
<td>21</td>
<td>21</td>
<td>20</td>
<td>24</td>
<td>23</td>
<td>12</td>
<td>20</td>
</tr>
<tr>
<td>Unit-related</td>
<td>14</td>
<td>16</td>
<td>18</td>
<td>15</td>
<td>12</td>
<td>12</td>
<td>13</td>
<td>10</td>
<td>17</td>
<td>11</td>
<td>14</td>
</tr>
<tr>
<td>Personal</td>
<td>19</td>
<td>17</td>
<td>13</td>
<td>25</td>
<td>14</td>
<td>27</td>
<td>24</td>
<td>18</td>
<td>25</td>
<td>22</td>
<td>20</td>
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<td>100</td>
<td>100</td>
<td>100</td>
<td>100</td>
<td>100</td>
<td>100</td>
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</tbody>
</table>

**Table 3. Distribution of Day Shift Nursing Time Among Direct Patient Care Activities (%)**

<table>
<thead>
<tr>
<th>Activities</th>
<th>W1</th>
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<th>W3</th>
<th>W4</th>
<th>W5</th>
<th>W6</th>
<th>W7</th>
<th>W8</th>
<th>Maternity Ward</th>
<th>Emergency Department</th>
<th>Mean</th>
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</thead>
<tbody>
<tr>
<td>Psychological care activities</td>
<td>6</td>
<td>4</td>
<td>7</td>
<td>8</td>
<td>6</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>3</td>
<td>3</td>
<td>4.9</td>
</tr>
<tr>
<td>Nutritional assistance</td>
<td>1</td>
<td>0</td>
<td>1</td>
<td>0</td>
<td>3</td>
<td>2</td>
<td>1</td>
<td>0</td>
<td>2</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>Hygiene</td>
<td>3</td>
<td>1</td>
<td>5</td>
<td>2</td>
<td>12</td>
<td>3</td>
<td>2</td>
<td>1</td>
<td>2</td>
<td>0</td>
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<tr>
<td>Toilet assistance</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>1</td>
<td>4</td>
<td>2</td>
<td>5</td>
<td>6</td>
<td>4</td>
<td>1</td>
<td>2.9</td>
</tr>
<tr>
<td>Administration of medications</td>
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<td>35</td>
<td>27</td>
<td>25</td>
<td>24</td>
<td>28</td>
<td>31</td>
<td>28</td>
<td>15</td>
<td>45</td>
<td>28.7</td>
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<tr>
<td>Assistance in patient ambulation</td>
<td>6</td>
<td>5</td>
<td>4</td>
<td>3</td>
<td>5</td>
<td>6</td>
<td>7</td>
<td>5</td>
<td>3</td>
<td>2</td>
<td>4.8</td>
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<tr>
<td>Monitoring vital signs</td>
<td>24</td>
<td>25</td>
<td>26</td>
<td>36</td>
<td>21</td>
<td>28</td>
<td>24</td>
<td>29</td>
<td>23</td>
<td>20</td>
<td>25.6</td>
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<tr>
<td>Obtaining specimens</td>
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<td>7</td>
<td>4</td>
<td>6</td>
<td>5</td>
<td>6</td>
<td>6</td>
<td>7</td>
<td>3</td>
<td>8</td>
<td>5.5</td>
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<tr>
<td>Nursing care</td>
<td>6</td>
<td>7</td>
<td>4</td>
<td>6</td>
<td>10</td>
<td>8</td>
<td>3</td>
<td>5</td>
<td>3</td>
<td>0</td>
<td>5.7</td>
</tr>
<tr>
<td>Transfer process</td>
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<td>4</td>
<td>2</td>
<td>2</td>
<td>1</td>
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<td>1</td>
<td>2</td>
<td>1</td>
<td>2</td>
<td>2.1</td>
</tr>
<tr>
<td>Patient discharge</td>
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<td>2</td>
<td>9</td>
<td>2</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>2</td>
<td>2</td>
<td>4</td>
<td>3.1</td>
</tr>
<tr>
<td>Visiting with physician</td>
<td>11</td>
<td>8</td>
<td>9</td>
<td>9</td>
<td>8</td>
<td>11</td>
<td>13</td>
<td>10</td>
<td>9</td>
<td>8</td>
<td>9.6</td>
</tr>
<tr>
<td>Tasks for maternity</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>30</td>
<td>0</td>
<td>2.9</td>
</tr>
<tr>
<td>Within ambulance</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>7</td>
<td>0.5</td>
</tr>
<tr>
<td>Total</td>
<td>100</td>
<td>100</td>
<td>100</td>
<td>100</td>
<td>100</td>
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<td>100</td>
<td>100</td>
<td>100</td>
<td>100</td>
<td>100.4</td>
</tr>
</tbody>
</table>
allocation as an indicator of nursing staff efficiency in a well-equipped and well administrated private hospital in Turkey.

The distribution of nurses’ working time on various activities was found to be similar in day and night shifts. The amount of time specified by our nurses for patient care (direct and indirect) falls within the range of 46-75% reported from literature. The time spent by nurses on patient care activities differ depending on hospital, ward, and the degree of patients’ needs and dependency. Also difference in the content of nursing practice and ward architecture may have an impact on nurses’ time distribution.

### The Content of Direct Care

The mean fraction of time spent by nurses on direct care varied from around one third to over the half. Regardless of medical ward, nurses generally spent most of their work time on administration of medications and monitoring the patients’ vital signs. Exception was observed in Maternity Ward, were nurses spent most of their time on maternity tasks. Neurology ward (W5), was second to the emergency department in taking the nursing time for direct care which is explained by the need high dependence of neurologically damaged patients for higher level of care.

### Unit-Related Activities

As health care providers, nurses are also responsible for managing the care environment, which is crucial for appropriate health care delivery. Our nurses spent 14% of their time on unit-related activities during day shift which is longer than that reported by Pelletier and shorter than that reported by Hendrich et al, Fitzgerald et al, and Korst et al. Evidence shows that intelligent hospital ultrastructure design can reduce the time for unit-related activities such as writing of requisitions, ordering transcripts, and communication.

### Personal Time

Naturally, nurses need adequate time for rest and relaxation.

In our hospital surveyed the nurses are allowed to have 40 minutes for break and 60 minutes for meal in a 12-hour shift. This means that nurses are allowed to spend 16%
of their shift time for rest. According to the literature the break time is quite suitable if it is no higher than 16% of the working time. It has also shown that breaks longer than 16% of the working time negatively affects the efficiency and productivity of the work.\textsuperscript{15}

In our study the fraction time spent on personal issues ranges from 13% to 27% averaging at 20% during day shift. Nurses of some of medical/surgery wards (W4, W6, W7) and maternity ward spent higher percentage of time for personal activities (24%-27%) during the day shift compared with other wards. This amount of time for personal activities is not only higher than what allowed in the workplace, but is also higher than that in several surveyed hospitals.\textsuperscript{2,5,6,14} In certain wards such as W4, W6, W7 and maternity wards the personal time was found to be higher that other wards in day shifts (24%-27%). Whereas, in the aforementioned wards the time allocated to direct patient care was lower (35%-43%) than average (average 46%). The situation is similar for the nurses’ time spending pattern over the night shift. According to the hospital regulations, the nurses are due to work 45 hours a week. The above situation indicates that the adequate time for patient care was compromised by the nurses’ need to address their personal affairs. One reason may be the long weekly working hours (more than 45) required from our nurses which causes psychological and physical fatigue. In addition, in the surveyed hospital, break and meal time is not considered as a part of work time which results in prolonged stay of the nurses in the hospital (up to 54 hours per week). The long working hospital stay and the stress associated with the by the long working hours could be the reason for the need for more personal time during work shift.

Study Limitation
Although we used a large sample to explore work time distribution of nurses, this sample was limited to a single private hospital. Therefore, caution should be exercised in generalizing the nursing time distribution pattern as observed in the present study.

Conclusions
Our work sampling study revealed the pattern of nursing time allocation in the survey hospital. The nurses allocate near half of their time to their primary task, i.e. direct patient care. The proportion of nursing time specified to direct patient care was the highest in the Emergency Department and the lowest in maternity ward. Administration of medication and monitoring patients’ vital signs were identified to be the most time-intensive patient care tasks. The nursing time distribution was virtually the same between the day and night shifts. While the nursing staff spent two third of their work time on patient care (either direct or indirect care), the time spent on personal activities is higher than that in several previous reports. This could be partly attributed to the relatively prolong stay of nurses in the hospital which would leave limited time for nurses’ personal affair off the work. Thus the information obtained here may be useful for optimal design of nursing time and schedule to achieve higher nursing staff performance.

Authors’ Contributions
The authors made equal contributions to the present study.

Competing Interests
The authors declare no competing interest.

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