Cancer Care and Residents’ Working Hours in Oncology and Hematology Departments: An Observational Real-time Study in German Hospitals

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Background: Physicians currently working in hematology and oncology wards are often frustrated with their working conditions. They express dissatisfaction with the working hours, poor organization of work and a low salary compared with the burdens of cancer care. However, to date, there have been no real-time observational studies to verify these subjective reports. Therefore, this study is the first to provide objective data about residents’ workload.

Methods: A real-time task analysis was conducted by individually observing 21 hematology and oncology residents at German hospitals. A total of 626 h of observation were performed using an Ultra Mobile PC.

Results: The residents observed in this study worked an average of 9 h 56 min per day, during which time was divided among the following activities: 31.20% for internal communication, 22.06% for indirect patient care and 10.99% for ward rounds. Per workday residents spent an average 6.20% of their shift time talking to patients.

Conclusions: This study provides the basis for future analyses on physicians’ workflow. Some key results may be used to recommend measures to improve physicians’ work performance and the quality of cancer care.

Key words: hematology and oncology – job task analysis – real-time observation – workload

INTRODUCTION

As the interest in German physicians’ working conditions has risen over the past two decades, it has increasingly become an object of much criticism. Specialists, such as oncologists and hematologists, have also demonstrated that they are dissatisfied with their work (1,2). As a result, many oncologists have decided to work abroad.

Previous questionnaire studies have suggested several reasons why qualified oncologists and hematologists choose to seek employment abroad, including, for example, the disparity between the burdens of providing cancer care and inadequate financial compensation. Long working hours, high pressure at work, poor chances at career advancement and job insecurity are further motives driving specialists to emigrate (2,3).

Working as an oncologist and hematologist involves treating and caring for tumor patients, which can be burdensome, stressful and emotionally and physically draining. More time and patience are often needed to deal with medical and personal problems than available (4–6). Furthermore, economic issues increasingly dictate German physicians’ work: physicians have to treat as many patients as possible, while still ensuring the best possible quality of patients’ treatment (7). This conflict often causes stress, which can be accompanied by health problems (4,8).

In addition, oncologists and hematologists often complain about the increasing amount of time spent on indirect patient care (9). This includes administrative and documentation duties as well as tasks which could be partly delegated to...
nurses or other assistants. Physicians must frequently work overtime to manage their heavy workload, which is not paid in a majority of cases (10). Although it is imperative, relatively little time remains for direct patient care.

All these factors can have a negative effect on physicians’ performance and lead to deteriorating patients’ and healthcare providers’ satisfaction.

As described above, questionnaire studies have provided much information about the current working conditions of physicians in hematology and oncology medicine (1,2,11). Nevertheless, drawing conclusions exclusively from self-reporting studies presents certain methodological limitations (12). Presently, objective data have not been reported concerning how much time oncologists and hematologists spend on their various job tasks. Therefore, we conducted a real-time job task analysis to provide exact data about physicians’ workflow in hematology and oncology hospital wards. The objective of this study is to assess the level of work efficiency and to identify potential areas of improvement.

PARTICIPANTS AND METHODS

SETTING AND SELECTION OF PARTICIPANTS

A trained research assistant observed 21 hematology and oncology residents during the study period from October 2008 to April 2009. All participants provided written informed consent. Observations were conducted in departments of hematology and oncology at inner city hospitals in Germany. Characteristics of these four hospitals are listed in Table 1. No significant differences were found between hospital characteristics.

DATA COLLECTION

A multidimensional work task classification system based on expert interviews allowing for efficient and standardized data collection was developed by the Institute of Occupational Medicine at the Charité Universitätsmedizin Berlin (13). Software was programmed and incorporated into a handheld computer (Ultra Mobile PC). Equipped with a stylus and a touch screen, the observer could easily record major and minor work tasks in real time. Software also allowed for recording of ‘multitasking’ activities if the participant was observed performing two tasks at the same time (13). Interruptions were recorded and defined as an interruptive event leading to a cessation of the current work task. Every task selected from the classification system was automatically and precisely recorded as a time value (hours:minutes:seconds) by the program using an access database. Since quick rotation of tasks and frequent interruptions are commonplace in the clinical setting, this multidimensional task categorization system is an accurate way of recording such data.

A research assistant shadowed each physician throughout three daily shifts. The observer accompanied participants during all of their activities documenting each as a time value. All observations took place on weekdays (Monday–Friday).

About 12 task categories, with a total of 70 subcategories, were comprised to characterize the majority of the job tasks performed sequentially or simultaneously by residents during typical work shifts (Table 1).

Simultaneous tasks were defined as more than one job task executed at the same time (e.g. walking within the hospital while talking to a colleague). In addition, the number of interruptions was recorded during the study period. Interruptions were defined as the discontinuation of job tasks due to external factors (e.g. phone calls).

To reduce the degree to which the physicians’ awareness of their participation in an observation study may have on their behavior (Hawthorne-effect), the observer stood at a distance of at least 3 m and avoided conversation with the participant.

VALIDITY OF TASK CLASSIFICATION

An inventory of tasks performed by physicians of hematology and oncology was developed following interviews with professionals in the field, after which physicians and researchers worked together to review this classification. After all physicians verified the task lists, it was used as a template for the initial collection of field data.

Initial monitoring took place in four hematology and oncology hospital departments to confirm the content validity. Two working shifts in each hospital were observed and the compiled data used to revise the initial task classification. A modified task list was established and used by researchers to record tasks performed by participating physicians during the study period.

OBSERVER TRAINING AND INTEROBSERVER RELIABILITY

Two research assistants received training in the observation and documentation of all work activities performed by residents during a working shift prior to the start of data collection. Each data collector spent five shifts monitoring a physician to become acquainted with the equipment, the specific job tasks and the department. The two research assistants then worked together to review the classification system. In addition, data collection was video-taped to ensure reliability of the recorded data.
assistants then tested the interobserver reliability by shadowing the same participant while recording data simultaneously but independently of each other. Six hours of interobserver reliability assurance testing took place. The resulting interobserver reliability was 88%.

**DATA ANALYSIS**

Data were collected by an access database and automatically incorporated into Excel spreadsheets (Microsoft Cooperation®) for subsequent analysis. Descriptive statistics were used to characterize tasks performed by participants, the number of interruptions and the amount of multitasking observed. Descriptive statistics were calculated using SPSS®, Version 18.0. All information remained confidential and anonymous.

**RESULTS**

**DEMOGRAPHIC CHARACTERISTICS OF PARTICIPANTS**

Of the 21 participating residents, 7 were female and 14 were male. The participants’ average age was 33 years [standard deviation (SD) = 3.9 years] and they had an average 3.27 years of work experience in hematology and oncology (SD = 2.12 years).

**ACTIVITIES PERFORMED BY PHYSICIANS IN HEMATOLOGY AND ONCOLOGY DEPARTMENTS**

In total, 63 workdays (37 573 min of work activity) were recorded during the study period. On average, the participating physicians treated 16 patients per day (SD = 2.27). The total time dedicated to the different work activities performed sequentially or simultaneously by all physicians is displayed in Table 1. The average shift lasted 9:56:24 h [95% confidence interval (CI) 9:40:12–10:12:37 h]. During this time, 26 min were spent on breaks on average (95% CI 0:22:52–0:28:49 h). The most time-consuming activities during an average shift were meetings, indirect patient care and ward rounds (Table 2).

**MEETINGS AND INTERNAL COMMUNICATION**

A substantial part of the workday was spent on meetings and internal communication, totaling an average of 2:25:21 h per day (95% CI 2:16:56–2:33:46 h) (Figure 1). Case conferences included time spent on managing patients and teaching or learning medical facts. Additionally, 44 min (95% CI 0:39:37–0:49:12 h) were spent on internal communication as a simultaneous task, secondary to other tasks.

Residents in hematology and oncology spent 31 min 25 s on phone calls (95% CI 0:27:23–0:35:28 h) (e.g. making

<table>
<thead>
<tr>
<th>Task category</th>
<th>Description</th>
<th>Average time main activity (hh:mm:ss)</th>
<th>SD main activity (hh:mm:ss)</th>
<th>Average time simultaneous activity (hh:mm:ss)</th>
<th>SD simultaneous activity (hh:mm:ss)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Internal communication/meetings</td>
<td>Discussions with colleagues or other medical staff; advanced training</td>
<td>03:05:09</td>
<td>00:40:32</td>
<td>00:45:24</td>
<td>00:18:53</td>
</tr>
<tr>
<td>Indirect patient care</td>
<td>Administrative tasks (writing a disability letter, daily notes, writing discharge instructions, chart rounds, changing infusion plans)</td>
<td>02:11:03</td>
<td>00:36:31</td>
<td>00:18:42</td>
<td>00:12:47</td>
</tr>
<tr>
<td>Ward rounds</td>
<td>Bedside examinations performed by one or more doctors</td>
<td>01:50:40</td>
<td>00:47:37</td>
<td>00:06:31</td>
<td>00:07:37</td>
</tr>
<tr>
<td>Walking time</td>
<td>Walking in hospital</td>
<td>00:36:09</td>
<td>00:09:47</td>
<td>00:01:53</td>
<td>00:01:29</td>
</tr>
<tr>
<td>Admission to hospital</td>
<td>Medical history taking and examining patients upon admission</td>
<td>00:26:37</td>
<td>00:36:02</td>
<td>00:03:16</td>
<td>00:04:23</td>
</tr>
<tr>
<td>Direct patient care</td>
<td>Medical examinations, functional diagnostics</td>
<td>00:49:24</td>
<td>00:29:32</td>
<td>00:06:09</td>
<td>00:04:00</td>
</tr>
<tr>
<td>Breaks</td>
<td>Recovery time (e.g. lunch), bathroom breaks</td>
<td>00:25:51</td>
<td>00:11:49</td>
<td>00:00:00</td>
<td>00:00:00</td>
</tr>
<tr>
<td>Communication with patients</td>
<td>Direct communication with the patient and/or their family</td>
<td>00:37:45</td>
<td>00:21:23</td>
<td>00:09:46</td>
<td>00:07:13</td>
</tr>
<tr>
<td>Supervision</td>
<td>Mentoring or support from other physicians</td>
<td>00:05:34</td>
<td>00:06:52</td>
<td>00:02:02</td>
<td>00:05:18</td>
</tr>
<tr>
<td>Teaching</td>
<td>Teaching hematology and oncology medicine to medical students</td>
<td>00:01:23</td>
<td>00:04:15</td>
<td>00:00:19</td>
<td>00:01:00</td>
</tr>
<tr>
<td>Miscellaneous activities</td>
<td>Changing working clothes, personal activities/belongings</td>
<td>00:19:01</td>
<td>00:10:04</td>
<td>00:00:31</td>
<td>00:00:42</td>
</tr>
<tr>
<td>Non-value-added work</td>
<td>Waiting for patients, searching for documents, reports, computer problems</td>
<td>00:12:31</td>
<td>00:05:20</td>
<td>00:01:58</td>
<td>00:03:10</td>
</tr>
</tbody>
</table>
inquiries, demanding medical reports, ordering medical examinations).

Per workday, the observed residents received 9 min and 40 s of advanced training (95% CI 0:06:12–0:13:08 h).

**INDIRECT PATIENT CARE**

Another major time commitment was indirect patient care. Overall, each physician spent an average of 2:11:03 h daily (95% CI 2:01:51–2:20:15 h) on indirect patient care, which includes all administrative tasks, chart rounds and changing infusion plans.

**WARD ROUNDS AND DIRECT PATIENT CARE**

Hematology and oncology residents spent 1:05:40 h (95% CI 0:53:41–1:17:40 h) on ward rounds and 0:26:37 min on admissions (95% CI 0:17:32–0:35:41 h). The mean daily duration of direct patient care (i.e. medical examinations, functional diagnostics) amounted to 0:49:24 min (95% CI 0:41:57–0:56:52 h).

**COMMUNICATION WITH PATIENTS**

The average amount of time spent on communication between doctor and patient was 0:37:45 min per day (95% CI 0:32:22–0:43:08 h). This task category includes the sum of the time recorded for therapeutic and diagnostic conversations, as well as for explanatory and counseling talks. Additional 0:09:46 min per day were spent talking to the patients as a simultaneous task (95% CI 0:07:57–0:11:53 h).

**IN-HOUSE TRAVEL AND NON-VALUE-ADDED WORK**

The physicians spent 36 min 9 s (95% CI 0:33:41–0:38:37 h) of their daily working hours walking distances within the hospital. Non-value-added work, such as waiting for patients or reports, computer-related difficulties or searching for documents cost the residents 12 min 31 s per day (95% CI 0:11:10–0:13:51 h). Miscellaneous activities (such as changing clothes) lasted 0:19:01 min on average (95% CI 0:16:29–0:21:33 h).

**MULTITASKING**

Residents spent 16.28% of each shift simultaneously performing more than one activity (SD = 4.1%). The most common concurrent task combination was indirect patient care and communication with colleagues. This combination was observed on an average of 0:28:02 min per workday.

**INTERRUPTIONS**

On average, hematology and oncology residents were interrupted twice an hour or a mean of 14 times per working day (SD = 3.2) (Figure 2).

**DISCUSSION**

The current investigation assessed working routines of residents in hematology and oncology hospital wards. To our knowledge, the present study is the first one to evaluate workload and workflow with real-time monitoring in the field of hematology and oncology.

Our study produced the following key results, which substantiated the physicians’ self-reports. By means of real-time work analysis, we found that the residents had to work overtime compared with the legal work contract and their work showed a predominance of indirect patient care over direct patient care.

Studies have illustrated in general that working overtime can lead to medical errors, such as misdiagnosis or malpractice. Physicians’ own health status can suffer as a result of sleep deprivation, irregular eating behavior, a lack of recuperation time and high levels of daily stress (14–16).

Our results show high rates of multitasking every day. Multitasking can be an indicator for occupational stress. Although multitasking is often unavoidable to complete all job tasks within a given time frame (17), reports from occupational studies have demonstrated that excessive multitasking leads to increased rates of stress and error (18). This stress can lead to health problems such as memory loss or an increased risk for heart attack or stroke (18,19). Research studies demonstrated that sustained multitasking may weaken memory performance (20) and a shorten one’s attention span.
This may lead to a poorer job task performance, compared with tasks done sequentially.

The high rate of interruptions during the working process is another stress factor observed for hematology and oncology residents. Previous studies demonstrate that this kind of work structure is not productive (21) and can lead to medical errors (22), as well as an increase of work strain and decreased job satisfaction among health-care providers (23,24).

Results of our study also show that hematology and oncology residents spent most of their time on internal meetings or on administrative and documentation tasks. By comparison, relatively little time was spent on direct patient care (e.g., medical examinations or communication with patients). Research studies demonstrated that the amount of time spent on direct patient contact has a significant influence on the probability of treatment success (25).

Cancer patients require much time and contact with the physicians who treat them. Moreover, they expect to play an active role in diagnostic and therapeutic decision-making processes (26).

Thus, hematologists’ and oncologists’ work requires not only a high level of professional competence but also substantial time to be reserved for communication with patients. More time spent on doctor–patient communication and patient-centered care leads to both fewer complaints in primary care and improved patient outcomes (27–29).

However, the mounting claim of documentation obligations could reduce the time available for direct patient care. Another study confirmed this conclusion and demonstrated that more time is dedicated to the explanation and documentation of activities than to meeting the medical needs of today’s patients (30).

**LIMITATIONS OF THIS STUDY**

The present study is subject to a few methodological limitations. First, the number of observed hematologists and oncologists was limited and therefore a larger cohort should be included in future studies to strengthen the external validity. Second, the method of observation and the participants’ awareness of taking part in a study might have influenced their behavior at work (Hawthorne-effect). Further task analyses with the same study design should be repeated to investigate variation among time values, which we expect to be minimal and not have significantly influenced the general conclusions of this study. Further research questions should be included in future investigations. It would be interesting to know how physicians’ income might influence their work performance or how medical mistakes are associated with physicians’ work load.

In general, additional investigations are needed to replicate these findings in other hospitals as well as further studies for physicians of other medical disciplines and levels of postgraduate education.

**CONCLUSION**

The study results partly confirm physicians’ perceived workflow problems concerning the long working hours, the increase of time for administrative duties and non-medical tasks and the relatively little amount of time spent on direct patient contact. Equally, non-value-added work, such as interruptions, was illustrated as poor work organization hindering hematologists and oncologists from achieving their peak work performance. The findings may be used to make recommendations to improve the working conditions of hematologists’ and oncologists’ and provide the groundwork for future analysis of this topic.

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**Conflict of interest statement**

None declared.

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**References**


