The objectives-based logbook
Raghoebaar-Krieger, Helga Maria Josette

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A pilot study to investigate when and how medical students should complete their logbook

H.M.J. Raghoebarger-Krieger¹, D.Th. Sleijfer², H.G. Kreeftenberg², W. Bender¹

¹Centre for Medical Education, Faculty of Medical Sciences, University of Groningen, Groningen, The Netherlands
²Department of Internal Medicine, University Hospital Groningen, Groningen, The Netherlands

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Abstract

**Introduction** In our logbook, diseases are stated which are required during the internship Internal Medicine, and students record which of these diseases they have encountered. To determine in which setting logbooks should be completed in order to obtain accurate information about the learning experiences of students, we investigated three sequential conditions under which logbooks are completed by students: (1) at the end of the internship without supervision; (2) during the internship without supervision; (3) during the internship with supervision.

**Method** The mean number of diseases recorded in each group was calculated, and an analysis of variance was done to test for differences between the three conditions.

**Results/Conclusion** Each group recorded that they had a broad exposure to the diseases in Internal Medicine, but they differed significantly in the number of diseases they have recorded. We conclude that the third condition ‘completing the logbook during the internship with supervision’ is the optimal condition to obtain accurate information. Therefore, it seems important to take into consideration the conditions under which logbooks are completed.
Introduction

To get insight into the experiences of medical students during their internships logbooks are used.\textsuperscript{1-4} A logbook is intended to evaluate whether the experiences of students are in accordance with the requirements of the internships and to evaluate the adequacy of the teaching programme of the medical school.\textsuperscript{3-7}

At the Faculty of Medical Sciences of the University of Groningen (the Netherlands) a logbook has been developed, based on national requirements described in the Blueprint 1994.\textsuperscript{8} The Blueprint was developed by the eight Medical Faculties in the Netherlands. In this document common objectives are set in three parts: general objectives, patient problems and discipline-related objectives. The general objectives contain a description of the knowledge, skills and attitudes necessary for a physician. The patient problems represent a list of problems a physician should know how to deal with. The discipline-related objectives represent a list of diseases and skills.

The Dutch Ministry of Education and Science requests the medical schools to guarantee that by the time of graduation, all their students have acquired the objectives of the Blueprint. Therefore, the Faculty of Medical Sciences in Groningen has worked out this document into a logbook for students to be used during the internship. The logbook includes among other things the list of diseases that students must have encountered during the internships. Only the diseases were included into a discipline-related logbook. The general objectives and problems are important but these objectives are not specifically related to a single discipline and have to be obtained during the continuum of the whole medical curriculum. Students have to record in the logbook the diseases they have encountered during the internship. In this way, insight is obtained into the learning experiences of students, and herewith the logbook can be considered as an evaluation instrument.

A logbook for students as described above has been implemented in the internship Internal Medicine at the University Hospital Groningen. To ensure that students get experience with the diseases as stated in the logbook, it is important that students fill out data which represent accurate information about their learning experiences. Inaccurate data of students’ experiences lead to wrong opinions about the learning process of students and about the teaching
programme.\textsuperscript{3}

To obtain accurate data, students' compliance in completing a logbook is an important factor.\textsuperscript{3,9} Other studies described that students' compliance is low; students did not like completing the logbook,\textsuperscript{9} and they found it time consuming especially when it was not integrated into supervision activities.\textsuperscript{5} Mitchell described that data are scored more accurately when the scorer is aware that he or she is being supervised.\textsuperscript{10} We also believe that students will score their experiences more accurately when the logbook is filled out daily, because students do not yet have developed a knowledge system in their memory which is well accessible.\textsuperscript{11,12} Therefore it is reasonable to assume that when the logbook is filled out daily in stead of at the end of the internship, and when it is integrated into supervision activities, students will be more stimulated to participate in completing the logbook and fill it out more accurately. However, filling out logbooks daily is laborious and tedious for students; moreover supervision is costly because it is time consuming. For these reasons it makes sense to evaluate other settings that combine ease with accuracy and less costs. These settings could be for instance daily completion without supervision or completion at the end of the internship without supervision.

To determine which setting is the best one to obtain accurate data we investigated three conditions of completing the logbook: (1) at the end of the internship without supervision; (2) daily during the internship without supervision, (3) daily during the internship with supervision. The data of the group of students that completed their logbook daily during the internship and with supervision are considered as the standard. The central question of this study was: ‘When (during or at the end of the internship) and how (with or without supervision) should logbooks be completed in order to obtain accurate information about students’ learning experiences?’ The study was performed at the department of Internal Medicine at the University Hospital Groningen.

**Method**

**Instrument**
The logbook used is an adaptation of the objectives of the Blueprint, related to the discipline Internal Medicine and it contains among other things which
diseases students should learn about during their internship at the department of Internal Medicine. The diseases are grouped on the basis of symptomatology, pathogenesis, and location, and hierarchically structured in clusters of illness (e.g. hematological disorders). There are 13 clusters in total and each cluster is composed of several subclusters (e.g. anemia). Each subcluster consists of a number of diseases (e.g. iron-deficiency anemia). The complete set of diseases numbers 228. Of these 228, 92 are labeled as ‘core’ diseases which means that students ought to have experience with these essential diseases. The other diseases are non-core and therefore optional.

**Procedure**

The students participating in this study are studying at the Faculty of Medical Sciences of the University of Groningen. Their first internship is at the Department of Internal Medicine at the university hospital, and it is the first clinical part of the curriculum after four preclinical years. The internship lasts 12 weeks, containing an 8-week inpatient component and a 4-week outpatient component.

Students are informed by the internship coordinator about the goal of the logbook and are requested to record the diseases they encountered during the internship. The coordinator instructs all students to write down the initial diagnosis of the patient, as well as all concomitant diseases. For instance, when a patient has been admitted because of angina pectoris, but also has hypertension and diabetes mellitus, all three diseases have to be recorded. The same instruction was also inserted in the logbook.

To determine when (during or at the end of the internship) and how (with or without supervision) the logbook should be completed, students filled out the logbook in one out of three different ways and thereafter their experiences were compared. The first group, consisting of 21 students, received their logbook and completed it in the last week of their internship, one or two days after their clinical examination. Group 2 (n=32) and group 3 (n=29) received the logbook at the start of the internship and were instructed to fill out the logbook daily, during the total period of 12 weeks. The second group completed the logbook without supervision. The third group filled out the logbook with supervision, which means that each student was supervised once a week to review the log and to discuss the encounters.
Data recording and collection was performed in the period from February 1996 until August 1997: from February 1996 until May 1996 group 1, from September 1996 until January 1997 group 2, and from January 1997 until August 1997 group 3.

**Analysis**

In this study we focus on the ‘core’ diseases. The mean number of core diseases encountered by the students and the corresponding standard deviation were calculated for each cluster and for the total number of diseases. The mean number was calculated by dividing the total numbers of registrations by the total number of students in each group. This was done for each cluster and also for the total number of diseases.

To test for differences in the scores between the groups with supervision (group 3) and without supervision (group 1 and 2) and the groups that filled out the logbook at the end of the internship (group 1) and during the internship (group 2 and 3) an analysis of variance was calculated. A p-value < 0.05 was considered statistically significant.

Moreover, we determined for each group to what proportion a specific cluster contributes to the total number of experiences, by dividing the number of experiences in a specific cluster by the total number of experiences in a group. By multiplying this outcome by 100, percentages were calculated.

**Results**

The results of the registrations by the three groups of students are given in Table 1. On average students recorded that they have had a broad exposure to the core diseases of Internal Medicine. The group of students that completed the logbook at the end of the internship (group 1) reported the highest mean number of diseases (78.3). The group of students that completed the logbook during the internship without supervision (group 2) reported a mean of 42.5 diseases. The total mean number of diseases reported by the group that completed the logbook during the internship with weekly supervision (group 3) is 54.9.
Table 1  Demand and mean number (mean) of experiences with core diseases and corresponding standard deviation (sd)

<table>
<thead>
<tr>
<th>Clusters</th>
<th>Demand(^a)</th>
<th>Group 1 (n=21)(^1)</th>
<th>Group 2 (n=32)(^2)</th>
<th>Group 3 (n=29)(^3)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>mean</td>
<td>sd</td>
<td>mean</td>
<td>sd</td>
</tr>
<tr>
<td>Gastrointestinal disorders</td>
<td>17</td>
<td>13.0</td>
<td>3.2</td>
<td>5.8</td>
</tr>
<tr>
<td>Cardiovascular disorders</td>
<td>14</td>
<td>12.7</td>
<td>1.4</td>
<td>8.9</td>
</tr>
<tr>
<td>Hematological disorders</td>
<td>9</td>
<td>8.9</td>
<td>1.7</td>
<td>4.2</td>
</tr>
<tr>
<td>Endocrinological disorders</td>
<td>9</td>
<td>8.0</td>
<td>1.0</td>
<td>4.8</td>
</tr>
<tr>
<td>Disorders of circulation</td>
<td>8</td>
<td>5.7</td>
<td>1.4</td>
<td>3.1</td>
</tr>
<tr>
<td>Respiratory disorders</td>
<td>8</td>
<td>7.1</td>
<td>0.9</td>
<td>4.5</td>
</tr>
<tr>
<td>Disorders of liver, gallbladder and pancreas</td>
<td>7</td>
<td>5.8</td>
<td>1.2</td>
<td>3.1</td>
</tr>
<tr>
<td>Auto-immune, rheumatological and connective</td>
<td>7</td>
<td>6.4</td>
<td>1.1</td>
<td>3.4</td>
</tr>
<tr>
<td>tissue disorders</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Renal disorders</td>
<td>6</td>
<td>5.5</td>
<td>0.9</td>
<td>2.7</td>
</tr>
<tr>
<td>Infectious diseases</td>
<td>4</td>
<td>3.1</td>
<td>1.0</td>
<td>1.0</td>
</tr>
<tr>
<td>Breast disorders</td>
<td>1</td>
<td>0.6</td>
<td>0.5</td>
<td>0.3</td>
</tr>
<tr>
<td>Vitamin deficiencies</td>
<td>1</td>
<td>0.9</td>
<td>0.4</td>
<td>0.5</td>
</tr>
<tr>
<td>Addiction/poisonings</td>
<td>1</td>
<td>0.7</td>
<td>0.5</td>
<td>0.3</td>
</tr>
<tr>
<td>Total score</td>
<td>92</td>
<td>78.3</td>
<td>10.9</td>
<td>42.5</td>
</tr>
</tbody>
</table>

\(^a\) the number of core diseases required during the internship at the department of Internal Medicine

\(^1\) completing the logbook at the end of the internship without supervision

\(^2\) completing the logbook daily during the internship without supervision

\(^3\) completing the logbook daily during the internship with supervision

The differences in the total mean score between the group with supervision (group 3) and without supervision (group 1 and 2) and the group that filled out the logbook at the end of the internship (group 1) and during the internship (group 2 and 3) are significant (F=39.93; p=.000); 50 % of the variance is explained by the moment of completion and 7% by supervision. The differences in the scores between the separate clusters were also significant, except for the cluster 'breast disorders'.

Next to the differences between the groups there were also differences between students within one group (the standard deviations corresponding with the mean total scores were respectively 10.9; 15.1; and 15.5).
Table 2 shows that each cluster contributes in almost the same proportion to the total score of each group. The proportion of each cluster to the total score differs up to a maximum of 5%.

### Table 2 The mean score as a percentage (%) of the total score

<table>
<thead>
<tr>
<th>Clusters</th>
<th>Group 1 (n=21)</th>
<th>Group 2 (n=32)</th>
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<tr>
<td></td>
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</tr>
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</tr>
<tr>
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<td>16</td>
<td>21</td>
<td>20</td>
</tr>
<tr>
<td>Hematological disorders</td>
<td>11</td>
<td>10</td>
<td>11</td>
</tr>
<tr>
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<td>10</td>
<td>11</td>
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<td>10</td>
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<tr>
<td>Breast disorders</td>
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<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Vitamin deficiencies</td>
<td>1</td>
<td>1</td>
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</tr>
<tr>
<td>Addiction/poisonings</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Total score</td>
<td>100 (78.3)</td>
<td>100 (42.5)</td>
<td>100 (54.9)</td>
</tr>
</tbody>
</table>

1 completing the logbook at the end of the internship without supervision  
2 completing the logbook daily during the internship without supervision  
3 completing the logbook daily during the internship with supervision

### Discussion

This study shows that the different conditions with respect to completing logbooks lead to different results. The three groups of students registered a different mean number of core diseases, although each cluster contributed in the same way to the total number of experiences. In other words, all students had comparable experiences with all clusters, but in one group they had more experiences in total, than in the other group. We believe that the group that filled out the logbook at the end of the internship, and without supervision (group 1) gave an overestimation of what really happened, and the group that
filled out the logbook during the internship without supervision (group 2) gave an underestimation. The group of students that completed the logbook during the internship, and with supervision (group 3), gave the best representation of what actually happened. We account for the plausibility of this conclusion as follows.

Group 1 had just finished their exam when they were asked to complete the logbook. We presume that these students did not fill out what they have experienced during the 12-week internship only, but also what they could recall about their experiences in general at the moment of completion. After these students had studied for their exam, they had an overview of the entire field of Internal Medicine, and then they behaved as experts by using the knowledge they obtained during their preclinical years as well as during their internship when completing the logbook. In several studies it is described that there is a correlation between expertise and recall, and that information is more likely to be remembered by those with more knowledge.\textsuperscript{13-15} We also believe that when these students have recalled the diseases, it is difficult to distinguish between what they have had experienced during the 12 weeks internship and what they have learned for their exam. It is even possible that students have mixed the experiences acquired during the internship with experiences acquired in the preclinical years. Therefore, we presume that students did not record only in the logbook what they have experienced during the specific 12 weeks at Internal Medicine, but also their experiences before the internship and what they have learned from their study material for their exam.

As the moment of completion explains the largest part of the variance (50\%) between the groups, it is a factor with considerable influence on the data that students are filling out into the logbook. Although the contribution of supervision to the differences between the groups is small, it seems nevertheless an important factor. We hypothesize that the group of students that completed the logbook during the internship without supervision (group 2) gave an underestimation in the number of experiences with diseases, demonstrating that filling out the logbook is a matter of priorities. As it has been shown that supervision promotes the attention to produce reliable notes into the logbook,\textsuperscript{10} we therefore believe that the lack of a supervising eye on this group did not stimulate students to record all their experiences with diseases. This hypothesis is also supported by the explanation of Dolmans et al. that students may
particularly feel it worthwhile to fill out the logbook when it is embedded in supervision activities. Because in group 2 the logbook was not integrated into supervision activities, it seems that this group did not keep their logbook up to date. As a result of this, the logbook of these students might lack data.

We assume that the daily registrations and supervision in group 3 promotes the attention to produce accurate notes in the logbook. The daily registrations of group 3 can be compared with a method often used in time allocation studies whereby students record on a time sheet their experiences; Cook et al. showed that this method gives a reliable insight into students’ experiences. Moreover, it has already been described that data are scored more accurately when scorers are aware that they are being supervised.

However, the interpretation of the results of this study are somehow speculative, because several aspects are uncertain. In the first place, by comparing the three groups of students, we considered the group that is instructed to complete the logbook daily during the internship and with supervision as the group which gave the best representation of what actually happened, but strictly speaking we can not prove that this group of students filled out the logbook accurately. Neither can we prove the accuracy of the data of the other two groups of students. Another aspect that may have influenced the data, is the availability of the diseases required. We do not know whether the hospital offers to all the students sufficient diseases during the 12-week internship to meet the requirements of the logbook. Moreover, the period of months during which data have been collected by the three groups, differs and we do not know whether the availability of diseases differs over the several periods of the year. But even if diseases are sufficiently available at a department this does not necessarily mean that all students will take advantage of them. As it was found in this study, students within a group differ in the reports they made, and it appears that these students did not make full use of the learning potential provided by the patients present at a department. This result is corroborated by other studies where differences in learning experiences between students were also demonstrated.

The logbook itself is also an aspect to be unsure about. Vanek et al. and Dent and Davis described the importance of a clear and user-friendly logbook as a critical factor to obtain accurate logbook data. Because this study is the first pilot during which we use logbooks as a method of data collection, we do not
know yet whether it functions well and whether students can use it without problems. As it was found that the requirements of the logbook have not been acquired by any of the three groups, it is possible that the requirements are not feasible to reach during the 12-week internship. This phenomenon also could reduce the motivation of students to complete the log. A reconsideration of the requirements to check whether they fit into the 12-week internship is therefore necessary.

In conclusion, it matters whether the logbook is completed at the end or during the internship and with or without supervision. Therefore it seems important to take these factors into consideration when logbooks are used to get insight into the learning experiences of students in a particular period of the internship and to assess whether the requirements of the logbook are met. To be more firm about this conclusion the study should be repeated after it is clear whether: (1) the logbook is filled out reliably; (2) the availability of diseases is sufficient to all students; (3) the logbook functions well. Until then we consider the condition 'filling out the logbook daily during the internship with supervision' as the optimal condition.

Acknowledgements
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