

# Assessment and Improvement of Medical Histories: Impact of Focused Feedback

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**ABSTRACT:** **Background:** Medical history-taking is an essential component of medical care.

**Objectives:** To assess and improve history taking, physical examination and management plan for hospitalized patients.

**Methods:** The study consisted of two phases, pre- and post-intervention. During phase I, 10 histories were evaluated for each of 10 residents, a total of 100 histories. The assessment was done with a validated tool, evaluating history-taking (maximum 23 points), physical examination (23 points), assessment and plan (14 points) (total 60 points). Subsequently, half of these residents were informed that they were assessed; they received their scores and were advised regarding areas needing improvement. Phase II was identical to phase I. The primary endpoint was a statistically significant increase in score.

**Results:** In the study group (receiving feedback after phase I) the physical examination improved from  $9.3 \pm 2.4$  in phase I to  $10.8 \pm 2.2$  in phase II ( $P < 0.001$ ), while in the control group there was no change ( $11.3 \pm 1.9$  to  $11.5 \pm 1.8$  respectively,  $P = 0.59$ ). The assessment and plan component improved in the study group from  $6.4 \pm 2.7$  in phase I to  $7.4 \pm 2.6$  in phase II ( $P = 0.05$ ), while no change was observed in the control group ( $8.2 \pm 2.7$  and  $7.8 \pm 2.3$ ,  $P = 0.43$ ). Overall performance improved in the study group from  $30.4 \pm 5.1$  in phase I to  $32.9 \pm 4.5$  in phase II ( $P = 0.01$ ), a 10% improvement, while no change was observed in the control group ( $35.5 \pm 6.0$  to  $34.6 \pm 4.1$ ,  $P = 0.4$ ).

**Conclusions:** A review of medical histories obtained by residents, assessed against a validated score and accompanied by structured feedback, may lead to significant improvement.

IMAJ 2016; 18: 479–483

**KEY WORDS:** medical education, students, residents, medical history, structured feedback

missed diagnoses, incorrect treatment and failure to achieve the above goals [1,2]. During their clinical clerkships, medical students are taught the art of history-taking and physical examination and are supposed to be qualified to perform these faultlessly. Nonetheless, many attending physicians are concerned that their 1–3 year post-graduate residents obtain medical histories and perform physical examinations that are significantly below expectation [3-5]. It seems imperative, therefore, that attending physicians provide educative feedback to their residents on these deficient histories. However, it is far from evident that attending physicians view this as part of their responsibility as teachers and overseers of their residents' activities. There is evidence in the literature that such feedback is actually productive [6-14], consisting mostly of direct observation, and various tools have been developed for this purpose [4,10]. Direct observation is, unfortunately, time and labor-intensive.

The aim of the current project was to evaluate and improve history-taking, physical examination and management plan for patients accepted to acute medical departments. This involved evaluating their electronic medical records and providing intermittent feedback to a study group of residents compared to a control group.

## SUBJECTS AND METHODS

The study was performed in the Division of Internal Medicine at Shaare Zedek Medical Center, a 1000-bed university-affiliated general hospital in Jerusalem. The division consists of four general internal medicine departments, an acute geriatric department and a hematology-oncology department. The study focused on these departments, except for the geriatric department, which employs its own residents. The Division employs 35 residents in medicine, 7 in geriatrics, and several fellows in hematology, gastroenterology and pulmonology, all of whom work night shifts and therefore take medical histories of newly admitted patients. The hospital maintains electronic patient files for documenting all aspects of patient care, including the medical history on admission, daily follow-up, consultations, results of laboratory tests, imaging tests (radiograms, computed tomography scans, ultrasound examinations, electrocardiograms, etc.), as well as discharge summaries.

**M**edical history-taking is an essential component of subsequent management and care, paving the way towards a diagnostic and treatment package that optimally addresses the patient's health issues and seeks to resolve these quickly and efficiently. It follows that inadequate or incomplete history-taking on arrival at the medical ward can be the cause of

The study comprised two phases. During phase I, two physicians – an attending physician and a department director – assessed 10 patient histories performed by each of 10 residents over a 2 month period, for a total of 100 histories. Accordingly, there were 10 histories per resident in order to assess for variability in quality of the histories. Included were only medical histories obtained by residents, rather than by interns or medical students. The assessment was done against a pre-determined tool [Appendix]. This tool allowed for evaluation of the quality of the history (Subjective), the physical examination (Objective), the overall Assessment of the patient, and the diagnostic and treatment Plan as recorded by the resident, according to the SOAP directive [15-19]. A mean  $\pm$  SD score was calculated for each resident for the 10 evaluated patient histories.

The assessors were aware of the identities of the residents they assessed, but the residents were unaware of the conduct of the study during its first phase. The assessors included an attending physician and a department director who independently reviewed and scored the same histories. During the first phase the various components of the residents' scores as marked by the two reviewers were compared to determine the validity of the score.

After the initial phase, the results were analyzed and the enrolled residents were divided into two groups: a control group of five residents who remained unaware of the conduct of the study until its conclusion, and a study group of the remaining five. The assignment of residents to the study or control groups was not random; we deliberately assigned residents with lower scores to the study group. The study group residents received structured feedback in a private conversation: they received the results of their scores and were advised constructively regarding areas requiring attention and improvement. No mention was made of continued observation.

Phase II was identical to phase I. The same assessor reviewed the histories taken by the same residents, half of whom had received feedback. The same number of histories and residents were assessed during a similar time period. The purpose of this second phase was to assess whether overall improvement was achieved and which areas deserved further educational investment. The residents included in the study were selected to serve as a representative sample, according to gender, age, country and medical school where they studied medicine and post-graduate year of training in the residency.

### STATISTICAL ANALYSIS

The primary endpoint was an improvement of  $\geq 10\%$  of the overall score (or separately  $\geq 5\%$  for history, physical examination, and assessment and plan) in the second (after-intervention) phase compared to the baseline result. Since in both arms 10 histories per resident were to be included, there would be 90–100 histories in each arm. Assuming an improvement of 20% between the first and second phase (from 60% to 80%),

the 90–100 histories in each arm would result in a significant difference with a  $P$  value of  $< 0.01$ . The secondary endpoint was a  $\geq 10\%$  improvement – in the second (after-intervention) phase – of the overall score in the study group residents compared to the control residents. Based on the assumption that the histories of residents in the control group would not improve, whereas those in the study group (who received individualized feedback) were assumed to have an improved score of  $\geq 20\%$ , 50 histories in each group (10/resident for a total of 5 residents in each group) would result in a significant difference with a  $P$  value of  $< 0.05$ .

### DATA ANALYSIS

Data were entered into an Excel spreadsheet. In order to compare quantitative (continuous) variables between two independent groups, the two-sample  $t$ -test was applied as well as the non-parametric Mann-Whitney test. The association between two categorical variables was assessed using either  $\chi^2$  or Fisher's exact test. All analyses were done using SPSS version 19. All statistical tests were two-tailed, and a  $P$  value of 5% or less was considered statistically significant.

## RESULTS

At the time of the study, the Division of Internal Medicine employed 35 residents, evenly distributed between the first, second and third year, with a smaller number in the fourth and final year of their residency. In the study we enrolled 10 residents, all of whom were in the first year of their residency.

The tool against which the medical histories were evaluated comprised the usual three components: subjective (oral history), objective (physical examination), and assessment and plan. The oral history and physical examination received a similar maximal total score (23 points each), and the assessment and plan component a maximal score of 14, with a maximal total of 60 [Appendix]. The inter-personal correlation between the two principal investigators, who conducted the actual assessment during phase I, is shown in Table 1. Overall, reviewer I gave slightly higher marks than reviewer II, the former being the younger attending physician, the latter a department director. There was no significant statistical difference between these assessors; more-

**Table 1.** Correlation of assessment between two reviewers (phase I)

Variable	Reviewer 1	Reviewer 2	Difference	Correlation
Medical and personal history	15.46 $\pm$ 2.90	14.42 $\pm$ 3.45	0.55	0.50
Physical examination	11.35 $\pm$ 2.84	9.38 $\pm$ 2.99	0.15	0.67
Assessment and Plan	8.46 $\pm$ 3.43	8.19 $\pm$ 2.48	0.95	0.50
Total	35.12 $\pm$ 6.94	31.62 $\pm$ 6.55	0.38	0.64
Corrected total	36.85 $\pm$ 7.66	32.53 $\pm$ 6.91	0.75	0.66

The scores are presented as score, mean  $\pm$  SD

over, the differences were consistent, i.e., reviewer I gave slightly higher marks for all components of the tool than reviewer II.

The results of the assessment of the medical histories are shown in Table 2. No significant increase in score for the history-taking component was noted between the pre- and post-intervention phases for both these groups. For the physical examination, significant improvement ( $P < 0.001$ ) was noted between the first and second phase in the study residents who received individualized structured feedback, but not in the control group. For the assessment and plan component, the study group demonstrated a significant improvement from phase I to II, while the control group remained unchanged.

As mentioned previously, the phase I mean score of study residents was lower than that of control residents. The scores, respectively, were as follows:

- history-taking:  $13.9 \pm 3.0$  vs.  $14.7 \pm 3.2$ ,  $P = 0.2$ , not significant [Table 2]
- physical examination:  $9.3 \pm 2.4$  vs.  $11.3 \pm 1.9$ ,  $P < 0.001$  [Table 2]
- assessment and plan:  $6.4 \pm 2.7$  versus  $8.2 \pm 2.7$ ,  $P = 0.001$  [Table 2]
- overall score:  $30.4 \pm 5.1$  vs.  $35.5 \pm 6.0$ ,  $P < 0.001$  [Table 3].

As a result of the intervention the scores of the study residents increased, while those of the control group did not, allowing for a narrowing of the gap in performance between these groups in the phase II scores.

## DISCUSSION

Staff physicians in all teaching hospitals and departments have to balance their time and energy between patient care on the one hand and supervision and teaching of residents on the other, and possibly other duties as well. Professional societies have issued guidelines for various components of resident training, ranging from number of monthly night shifts to how certain procedures should be taught. Education being education, variability in multiple components of resident teaching between departments is very significant and debates regarding optimal methods will probably continue forever [1-7]. However, there seems to be near-universal consensus that feedback is a highly important means to achieve educational goals [8,13]. Nonetheless, there is evidently a significant gap between the desired amount and quality of feedback and what actually transpires. This study focused on the quality of the medical history as obtained and written by medical residents and aimed to improve these histories in a pre- and post-intervention study. The intervention consisted of one structured feedback session conducted in privacy on a one-to-one basis between the observed residents and one attending physician.

Other studies have focused on various components of the medical intake process, such as observation of the resident-patient interaction, the actual history-taking and conduct of the

**Table 2.** The medical history, pre- and post-intervention

Group	Residents (10 histories per resident)	Pre-intervention	Post-intervention	P value
<b>Medical &amp; personal history</b>				
Study group	1	14.6	15.3	
	2	14.4	14.3	
	3	14.3	13.6	
	4	13.3	14.1	
	5	12.7	13.7	
	Mean ± SD	13.9 ± 3.0	14.2 ± 2.5	
Control group	6	14.2	NA*	
	7	17.2	14.8	
	8	15.8	15.3	
	9	13.5	14.0	
	10	13.0	14.7	
	Mean ± SD	14.7 ± 3.2	14.7 ± 2.3	
<b>Physical examination</b>				
Study group	1	10.8	10.9	
	2	9.1	10.9	
	3	10.8	12.6	
	4	7.3	8.6	
	5	8.9	10.8	
	Mean ± SD	9.3 ± 2.4	10.8 ± 2.2	
Control group	6	11.2	NA	
	7	11.2	10.4	
	8	11.6	10.7	
	9	11.5	13.0	
	10	11.1	11.9	
	Mean ± SD	11.3 ± 1.9	11.5 ± 1.8	
<b>Assessment and plan</b>				
Study group	1	5.9	5.6	
	2	7.9	9.0	
	3	4.7	6.6	
	4	6.2	7.1	
	5	7.0	8.9	
	Mean ± SD	6.4 ± 2.7	7.4 ± 2.6	
Control group	6	5.6	NA	
	7	8.5	8.8	
	8	9.4	8.2	
	9	8.6	7.7	
	10	8.1	6.4	
	Mean ± SD	8.2 ± 2.7	7.8 ± 2.3	

\*This resident unexpectedly left the residency program

**Table 3.** Overall performance, pre- and post intervention

Group	Residents (10 histories per resident)	Pre-intervention	Post-intervention	P value
Study group	1	31.9	32.5	
	2	32.1	34.8	
	3	30.3	33.1	
	4	27.6	30.0	
	5	30.1	33.9	
	Mean ± SD	30.4 ± 5.1	32.9 ± 4.5	
Control group	6	31.2	NA*	
	7	38.1	34.1	
	8	38.4	35.4	
	9	34.5	34.9	
	10	34.2	33.9	
	Mean ± SD	35.5 ± 6.0	34.6 ± 4.1	

\*This resident unexpectedly left the residency program

physical examination [3,4,6,10]; on discharge summaries [20]; and on actual clinical performance [21]. We chose the written intake as the subject for assessment and improvement. The disadvantage of this approach is that the written document may not accurately reflect the actual intake process [11,18]. However, the written document is highly important as it serves as baseline for the ensuing hospitalization, and most specifically in the current era with frequent handovers. Moreover, the written document serves as a medical-legal source of information.

Our study yielded several main findings: first, the mean score assessing history did not change significantly between phase I and II in the study group (who received feedback after phase I) and the control group (who did not receive feedback). However, a clinically and statistically significant improvement was recorded in the study group in phase II (compared to phase I) in three important areas: physical examination, assessment, and plan, while no change was observed for the control group. Overall performance improved in the study group from  $30.4 \pm 5.1$  in phase I to  $32.9 \pm 4.5$  in phase II ( $P = 0.01$ ), a 10% improvement, while no change was observed in the control group ( $35.5 \pm 6.0$  to  $34.6 \pm 4.1$ ,  $P = 0.4$ ). However, we were disturbed by the fact that the overall performance was far from the optimal mark (60), even for the better performing residents, particularly in the second phase of the study. This clearly indicates that more energy and effort need to be invested by attending physicians in the actual supervision and teaching of their residents. Many attending physicians are probably aware of the far from optimal intake documents produced by their residents. One wonders, however, whether they are motivated to invest time and energy in providing quality feedback to their residents to achieve continuing improvements. There is obviously no specific remuneration for these efforts, leaving it to each attending physician's discretion and individual motivation.

In addition to these drawbacks, there remain significant questions: have attending physicians been taught and do they know how to provide effective feedback? Feedback should not be confused with advice or grading and evaluation [22]. Wiggins [23] describes the essentials of effective feedback in a seminal paper. First, feedback should be goal-directed, i.e., a well-recognized and agreed-upon goal should be defined. Second, there should be tangible and transparent results related to the goal. Third, effective feedback should be concrete, specific and useful, i.e., it should provide actionable information. Fourth, feedback should be provided in a user-friendly way, without undue technical details, being mindful not to overwhelm the student. Fifth, feedback should be provided timely, as close as possible to the events that require feedback. Nonetheless, the timing and place should be optimal, e.g., although the attending physician has seen an inadequate medical history he could choose to postpone providing feedback because the involved resident is weary after a particularly tiring night shift – and he/she could schedule a private talk for the next day. Sixth, feed-

back should be ongoing, allowing for a process of continuous learning. Accordingly, feedback should ideally be short and informative. Finally, in order to be useful, feedback needs to be consistent. Residents will be best served by stable, accurate and trustworthy information provided in a timely, but wisely chosen moment and place. Teaching departments should be well served by having their staff discuss and decide on specific long-term and short-term educational goals. The study and its results presented in this paper were presented and discussed at a staff conference in our department, which sparked the beginning of an ongoing educational process among staff, residents and students, most probably for the benefit of all.

This study has several limitations: first, the study and control groups were small. However, this is offset by the large number of histories per resident, a total of 100 in phase I and 90 in phase II; the number in phase II was smaller because one resident unexpectedly dropped out. Second, the study and control groups were not randomly selected. Rather, we chose to assign residents with poorer scores to the study group, and those with the higher marks to the control group. Although a limitation, this allowed for achievement of demonstrable improvement. However, in spite of the 10% improvement in the study residents' score, the overall score in phase II remained far from optimal (60):  $32.9 \pm 4.5$  for the study group and  $34.6 \pm 4.1$  for the controls ( $P < 0.01$ ). The study, therefore, has indicated an important goal for improvement of medical residents' performance. Third, the tool for assessment of the medical histories reflects certain components that these researchers felt should be included. Other physicians may accentuate other components or place higher value on specific components. Nonetheless, the significant correlation between the results of the two assessing attending physicians suggests high correlation and validity.

In conclusion, this study has demonstrated that the medical history on admission can and should be improved. Second, structured and factual feedback, provided in a neutral and constructive manner within a private conversation, can lead to significant improvement. It needs to be demonstrated that repeated feedback provided in this manner may lead to further and step-wise improvements.

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**Appendix.** The assessment tool, according to the SOAP approach [24]

	Medical History		Physical Examination		Assessment & Plan	
Date of history	<b>Personal Identification</b>		<b>General impression</b>	1	Summary provided?	2
	Name (appears auto)*	0	Pulse, described	1		
	Marital status (auto)*	0	Blood pressure	1		
	No children	1	Respiratory rate	1		
	Residence (auto)*	0	O <sub>2</sub> saturation	1		
	Profession	1	Temperature	1		
	<b>Chief complaint</b>		Peripheral pulses		Differential diagnosis provided	3
	Description	1	Arms (≥ 2)	1		
	<b>Current illness</b>		<b>Head</b>		If yes, with discussion of pros and cons of each?	2
	Detailed description	4	Carotids	1		
	Duration	2	Thyroid	1		
	Associated risk factors	2	Eyes	1		
			Neck	1		
<b>Past medical history</b>		<b>Heart</b>		Itemized plan for investigations?	3	
Itemized	2	PMI	1			
Detailed description	4	Sounds	1			
		Murmurs	1			
<b>Habits</b>		<b>Lungs</b>		Itemized plan for treatment	2	
Smoking	1	Description	1			
Alcohol	1	Accessory sounds	1			
		Drugs	1			
<b>Medications</b>		<b>Abdomen</b>		Problem list?	2	
Itemized description	1	Description	1			
Dosing described	1	Spleen	1			
		Liver	1			
		<b>Legs</b>				
		Edema	1			
		Pulses (≥ 2)	1			
		<b>Neurology</b>				
		Cranial nerves	1			
		Motor nerves	1			
Score of column (max)	23		23		14	
Total score (max)	60					

\*Appears electronically  
PMI = point of maximal intensity, the apex