Creating a culture of thoughtful prescribing

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Abstract

Background: In the Netherlands 170,000 patients yearly fall victim to poor communication between health care professionals, with 44% of patients receiving inappropriate therapy as a result. Evidence indicates that this problem may be due to physicians learning to communicate therapeutic content by unstructured means during training.

Aim: To introduce a structured format for creating and communicating therapeutic plans; to provide for students opportunities practice and feedback on their abilities.

Methods: We developed the Individualized Therapy Evaluation and Plan (ITEP) for therapeutic decision-making and communication based on the subjective objective assessment and plan note. The therapeutic plans from students of the 2003 cohort were assessed with one simple and one complex case using a 15-point criteria form. Over the next 3 years students were given more practice using the ITEP and the average score on the complex case was tracked and compared to the 2003 cohort.

Results: In cohort 2003, 82% of the students satisfactorily completed the simple case, while only 32% did so with the complex case. In subsequent years, the average scores on the complex case significantly improved from 3.8 to 6.8 with increasing practice.

Conclusions: Students can select a simple drug regimen, but without practice using the ITEP will not help to deal with multiple disease states.

Introduction

Worldwide, there is an increasing evidence that medical errors arise from poor communication between health care providers (Colley & Lucas 1993; Lesar et al. 1997; Cooper 1999; Dean et al. 2002a). In the Netherlands, public concern increased when it was reported that 170,000 patients yearly fell victim to poor communication between health care professionals (Foekema & Hendrix 2006). This report found that poor communication between health care providers regarding patient’s medications led to inappropriate therapy (in 44% of the cases) or no treatment at all (in 25% of the cases). Surprisingly, not all the cases were caused by miscommunication between the physician and the pharmacist, as more than half were caused by poor communication between physicians (Hentenaar 2003; Foekema & Hendrix 2006).

This should not be surprising, because in contrast to other aspects in medical charting (review of systems, physical examination, etc.) physicians learn a variety of methods for communicating therapeutic information. There is a growing body of literature that documents the lack of proper training of physicians in the area of rational drug prescribing (Dean et al. 2002b; Dhalla et al. 2002; Akici et al. 2004). One method endorsed by the American Family Physicians to facilitate communication between health care providers is the use of the Problem-Oriented Medical Record (POMR) (Rakel 1974). The POMR is widely used in the United States and it has been shown that records using this structured format are more complete than those using free dictation as a format (Salmon et al. 1996; Ho et al. 1999). More importantly, other studies support the hypothesis that the POMR may have improved the thoroughness of patient care when they evaluated the outcomes for patients (Fernow et al. 1978; Starfield et al. 1979).

In the Netherlands, there is no nationally (or locally) accepted format for the medical charting of therapeutic information. At Leiden University Medical Center, it has been assumed that students will learn how to solve and communicate therapeutic plans from the traditional teaching model employed in medical schools: the apprenticeship. This means the therapeutic format employed will always vary depending on the site and mentor. In a previous study, we determined the extent of the local problem by examining the therapeutic...

Practice points

- Even students late in the curriculum have difficulties evaluating current drug therapy and making treatment decisions for multiple medical problems.
- With practice, medical students can be taught to communicate their rationale behind a therapeutic choice.
- It is beneficial to have the students practice clinical skills early in the curriculum; this includes such patient-specific activities as therapeutic decision-making.
contents of consult letters written by specialists to the referring general practitioner (Franson et al. 2006). While most letters contained enough information regarding the diagnostic aspects of the problem for which the patient presented, there was insufficient information for the general practitioner to follow the therapeutic plan. Our findings provided the stimulus to have our medical students learn how to develop and communicate a therapeutic plan using a structured format much in the same manner in which they learn to develop and document the diagnostic process. Educational evidence suggests that skills such as using a more structured patient reporting format need to be introduced early in the curriculum in order to enhance adoption (Remmen et al. 2001; Lam et al. 2002; Liddell et al. 2002). Self-study assignments and assessments by which students can repeatedly practice and evaluate their performance have been shown to advance this type of learning (Marzano et al. 1993; Remmen et al. 1999). Furthermore, another group who previously attempted to systematize the teaching of POMR in second-year medical students, found that students learned the format whether they participated in self-study or a specific workshop (Bashook et al. 1975). Thus, our goals were (1) to introduce early into the Leiden University Medical Center curriculum a structured format for communicating a therapeutic plan; (2) to give the students multiple self-study opportunities throughout the curriculum (both pre-clinical and clinical) in which to practice and have feedback on their therapeutic planning skills and (3) to assess how students perform when using the therapeutic plan format.

### Methods

#### Educational methodology

At Leiden University Medical Center (a university offering a 6-year undergraduate program) we introduced a structured format called the Individualized Therapy Evaluation and Plan (ITEP) for students to communicate a therapeutic plan. The ITEP format is used to aid therapeutic decision-making and communication and is based on an expanded Subjective Objective Assessment and Plan (SOAP) note (Wallace & Franson 1996) from the POMR. The difference between the ITEP and the SOAP is that the ITEP minimizes the subjective and objective portions of the SOAP, while expanding the assessment and plan sections to include more therapeutic information (Table 1). The assessment includes an evaluation of the clinical presentation, pathophysiology and current therapy that is patient-specific and relevant for that moment. The choices made for the plan for treatment and monitoring must include a rationale that is relevant not only to the patient, but also to the society (i.e. costs). The aim of using the ITEP during pharmacotherapy training is to give the students practice opportunities for drawing up and providing a rationale-based treatment plan for an individual patient. Students are provided with the format as well as clear performance criteria (Appendix), so they can know how well they are performing this task during their practices. Repetitive and consistent utilization of this criteria form during self-, peer- and instructor-evaluations allows the students to incorporate the therapeutic decision making process into their patient care practice.

Students are introduced to the writing of the ITEPs early in the curriculum (in the beginning of the second year) and continue to practice throughout their clerkships. The students' first experience with ITEP writing is with a paper case in a workshop situation (up to 12 students being led by a tutor in a small classroom). The cases provided to the students are such that the patient presents with a clinical presentation that is typical for a particular disease state, and warrants treatment with the standard first-line therapy found in most treatment guidelines. This is to make sure that the students learn the pathophysiology of different disease states, understand the pharmacology of the most commonly used medications for that disease and finally why one drug is considered to be the drug of choice. Student participation in the workgroup is ensured by having an ITEP writing section on the course exam which represents a follow-up moment of the case presented in the workgroup. These follow-up cases are based on a clinical situation in which the patient presents with a drug-related problem as described by Hepler and Strand (Table 2) (Hepler & Strand 1990; Strand et al. 1990). Because the types of (and solutions for) drug-related problems are finite in number, students can study by predicting the patients’ clinical presentation on the exam.

Throughout the rest of the pre-clinical curriculum, students are given multiple opportunities to practice ITEP writing after either witnessing a patient presentation during lecture or reviewing computerized ‘paper’ patient cases and using an online editing program. In both these situations the medical history and physical examination is provided. The students get

<table>
<thead>
<tr>
<th>Table 1. ITEP: Individual Therapy Evaluation and Plan.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Evaluate the patient’s disease states:</td>
</tr>
<tr>
<td>• Make a list of disease states and indicate the status of each</td>
</tr>
<tr>
<td>• Describe the aetiology/pathophysiological mechanism of each problem supported with the complaints, symptoms and results of the patient</td>
</tr>
<tr>
<td>Evaluate current therapy for each disease state:</td>
</tr>
<tr>
<td>• Determine if current therapy (drug, non-drug, home remedy or surgical) is effective and safe (without side effects)</td>
</tr>
<tr>
<td>• Support this by comparing the relationship between the pathophysiology of the medical problem with the mechanism of action of the therapy and evaluating the patient’s complaints, signs and symptoms</td>
</tr>
<tr>
<td>Evaluation of patient-specific parameters that can influence therapy:</td>
</tr>
<tr>
<td>• Patient specific data (PK, allergies, side effects)</td>
</tr>
<tr>
<td>• Disease specific data (drug–disease interactions)</td>
</tr>
<tr>
<td>• Drug specific data (dose, cost, interactions)</td>
</tr>
<tr>
<td>• Patient compliance</td>
</tr>
<tr>
<td>Write a therapy plan based on your evaluation:</td>
</tr>
<tr>
<td>• Indicate your plan for current therapy (stop, continue, increase/ decrease dose, etc.)</td>
</tr>
<tr>
<td>• Choose (if necessary) new therapy (non-drug, drug, surgical, etc.)</td>
</tr>
<tr>
<td>• Specify for each therapy the dose, route, frequency and duration</td>
</tr>
<tr>
<td>• Provide the rationale for your choice of therapy, dose, etc. Support this by describing the mechanism of action and impact of patient-specific data (as described above)</td>
</tr>
<tr>
<td>• Write a complete prescription</td>
</tr>
<tr>
<td>Monitor therapy plan:</td>
</tr>
<tr>
<td>• Describe the goals and monitoring parameters (with appropriate time intervals and frequencies) to determine efficacy of the therapy</td>
</tr>
<tr>
<td>• Describe monitoring parameters (with appropriate time intervals and frequencies) to determine side effects and toxicity of the therapy</td>
</tr>
</tbody>
</table>

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feedback on their ITEPs either (1) directly during the lecture, (2) from the online editing program, (3) through discussions during workgroups or (4) in review sessions prior to the examinations. During the clerkship portion of the curriculum, the students perform their own medical histories and physical examinations in order to write ITEPs for patients seen on rotations. During the internal medicine rotation, for example, the students are instructed to write five ITEPs which are evaluated by their direct mentors and (depending on the site) either placed in the students’ portfolio or entered into the patient chart. Students are instructed to direct their selection of patient cases toward the most common disease states based on morbidity/mortality data (e.g. hypertension, diabetes, etc.).

Evaluations

Assessment 1. During the first year of adoption (2003), students were taught the ITEP principles and then given computerized practice cases to study in the two final courses prior to clerkships. The assessment of this cohort of students served as a baseline to evaluate student performance when using the ITEP to solve two different therapeutic cases. The cases differed in topic and complexity: the paediatric case was simple with a single disease state and the geriatric case was complex with multiple disease states. On the paediatric ITEP exam, the student only had to determine that current non-drug therapy was not effective and that new drug therapy had to be started. On the geriatric ITEP exam, the student had to manage a drug-induced side effect, an under-treated disorder and a non-treated problem. The ITEP exams were blinded and then assessed using a 15-point criteria form spanning the therapeutic plan. The assessment determined if (1) the ITEPs were satisfactorily completed and (2) which section of criteria was the most difficult for the students.

Assessment 2. In the subsequent years, each cohort of students increasingly followed the curricular plan as described in the education methodology section. As such, we tracked the number of ITEP cases with which the students had been assessed prior to taking the geriatrics exam with the complex case. The second assessment then tracked student performance on making a therapeutic plan on the complex geriatrics case, and compared to the students’ performance on ITEP writing from the first year of adoption (cohort 2003).

### Table 2. Drug-related problems included in students’ practice cases.a.

<table>
<thead>
<tr>
<th>Problem type</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Untreated medical problem</td>
<td>untreated medical problem</td>
</tr>
<tr>
<td>Improper medication selection</td>
<td>improper medication selection</td>
</tr>
<tr>
<td>Too little medication</td>
<td>too little medication</td>
</tr>
<tr>
<td>Failure to receive medication</td>
<td>failure to receive medication</td>
</tr>
<tr>
<td>Too much medication</td>
<td>too much medication</td>
</tr>
<tr>
<td>Adverse drug reaction</td>
<td>adverse drug reaction</td>
</tr>
<tr>
<td>Drug interaction</td>
<td>drug interaction</td>
</tr>
<tr>
<td>Medication use with no indication</td>
<td>medication use with no indication</td>
</tr>
</tbody>
</table>

Note: aAdapted from Hepler & Strand (1990); Strand et al. (1990).

### Statistical analysis

For the first assessment, the percentage of student ITEPs not meeting each of the criteria (designated as [−] on the criteria form) was assessed (those ITEPs that were evaluated as either mostly meeting criteria [v] or meeting criteria [+] were grouped). Comparison between student cohorts 2003 and the years 2004–2006 was evaluated by using an analysis of variance after scores were normalized to 10.

### Results

**Assessment 1.** In the 2003 baseline cohort, 82% of the 221 students satisfactorily completed the simple case, while only 32% of 181 students did so with the complex case. For the simple case, the ITEP criteria analysis identified only drug interactions as something with which the students struggled. In this case, nearly 85% of the students failed to see that the recognized ‘drug-of-choice’ had a potential for drug interactions. In the complex case, more than 40% of students were unable to meet half of the criteria. Students only did slightly better at recognizing potential drug interactions, as still 61% had difficulties. In addition to identifying drug interactions, the students could not meet the criteria for assessing pathophysiology, and current drug therapy, as well as determining plans for current or new drug therapy, the proper dosing and indicating the goals or monitoring parameters for efficacy and toxicity of the plan.

**Assessment 2.** The results of Assessment 2 are shown in Table 3. The number of previous assessments using the ITEP format increased for each cohort of students. Each year’s cohort of students also performed significantly better than the 2003 cohort which had little practice.

### Discussion

Our results suggest that the students were able to use the ITEP format for writing their therapeutic plans, and that the continued use of the ITEP format in the curriculum improved the students’ ability to solve case studies and communicate therapeutic plans. Our initial assessment of the first cohort indicated that students in their final courses prior to clerkships were able to solve simple cases. In addition, they were able to adopt the ITEP format for communicating the information fairly well. However, when given a case of a typical geriatric patient that involves multiple disease states and unresolved problems, the students struggled. While most of the criteria were not satisfactorily met for more than 20% of the students, certain criteria were rarely addressed appropriately by the students. These included assessment of the current therapy, determining appropriate new therapy, identifying potential drug interactions and accurately writing a prescription.

To illustrate the types of problems the majority of students (57%) had with assessing current therapy, students often missed or identified the wrong drug causing a drug-induced problem (e.g. side effects). Because of this, 64% of students’ new therapy plans would include starting a new less-effective drug for a well-treated condition, or starting the patient on...
another drug to solve the side effect. Regardless of
the assessment or plan that the students developed, 61% did not
identify the potential drug interactions that existed in their
plans. Finally, most (90%) were unable to make a definitive
decision regarding the therapy regimen they had chosen and
thus wrote inappropriate prescriptions. Most commonly the
students would forget frequency regimens, or only indicate
dosing ranges instead of a specific dose, but sometimes their
prescriptions would border on nonsense, e.g. ‘perhaps maybe
the patient should be started on something like a broad
spectrum antibiotic’.

The follow-up assessments that took place in the 3 years
after the introduction of the ITEP in the curriculum had shown
significant improvement in the students’ abilities to use the
ITEP to solve therapeutic problems. Students were now able to
do a better job assessing current therapy and developing a
therapy plan, but had become more lax at providing
monitoring parameters for safety (criteria #15 of the ITEP).

We are encouraged by the progress that the students have
made over time, particularly in their ability to write more
concise, definitive therapy plans. We think that using ITEPs
for practice and for assessment has improved the pharmacotherapy
education at our institution. Most institutions choose to assess
students with multiple-choice questions in order to differentiate
the students from strongest to weakest. However, we feel that
using the open questions in the ITEP format offers the following
improvements and skills: (1) It provides the students with
practice and feedback on an activity that is applicable to the
activities of a practicing physician; (2) it prevents students from
using therapeutic algorithms to determine therapy in a cook-
book fashion; (3) it provides training in good prescribing habits;
(4) it addresses the problem of poor communication between
clinicians, which we hope will ultimately have an impact on
patient care and (5) it prepares students for the use of electronic
patient medical records.

On this last point, it has previously been suggested that use
of the electronic patient medical record can solve the
communication problem (Foekema & Hendrix 2006). But
this is unlikely, as the ability to communicate depends on both
the form and the content of the electronic patient medical
record. Current electronic patient medical records are limited
to the sharing of patient data such as past medical history,
medication lists and results of physical examinations and
diagnostic tests (laboratory, radiological, etc.) with limited
possibilities for the documentation of a therapy plan.

Physicians first need to learn a structured method in which
to uniformly enter information regarding the therapy plan into
a patient chart, then this format can be adopted by the

Students’ perceptions of their abilities after using the ITEP
method have been assessed and reported elsewhere (Dubois
et al. 2007). Due to the success of this method and others,
Leiden University teamed with the other Dutch medical and
pharmacy schools to create a national format for creating a
therapeutic plan. Implementation is on going.

Limitations
We recognize that the improvement in ITEP scores between
the 2003 and 2006 cohorts could be attributed to a number of
factors. First, it is possible that the evaluations of the ITEP
between the cohort years could have been biased. Unfortunately,
the same cases could not be given between the years due to a change in course coordinators and focus of
topics taught in the course. In addition, the evaluators could
have expected a poorer outcome and thus gave lower scores
at the outset or made the first case significantly harder.
However, this would be unlikely, as this would have resulted
in too many ‘good’ students having a poor grade. Conversely,
if the second grade is graded too easy, too many ‘poor’
students would receive a passing grade. It is also impossible
to attribute these findings to the impact of the introduction of the
ITEP into the curriculum alone. Other possibilities outside the
control of the researchers include: (1) the later cohorts could
have consisted of stronger groups of students; (2) other
changes in the curriculum had occurred between the cohorts,
improving their abilities; (3) the students now knew the impact
the ITEP had on their grades and studied more for the exam.
Lastly, the ultimate goal of our educational intervention is to
improve patient care by improving physicians’ communication
of therapeutic plans (as described in the background study for
this article Franson et al. 2006), but this assessment is not yet
possible since the later cohort have yet to achieve prescribing
rights.

Conclusions
We were able to develop a new format (the ITEP) for students
to use to develop and communicate therapy plans. With little
practice, students could use the ITEP to develop simple
therapy plans where they were only required to know how to
start a drug of choice. However, they were not able to deal
with difficult cases in which there were multiple problems or
current therapy that is not working. After practicing with the
ITEP throughout the curriculum, subsequent cohorts of
students were able to greatly improve their ability to develop
and communicate therapeutic plans for the more difficult
cases.

Table 3. Data from the four cohorts taking the complex geriatrics exam.

<table>
<thead>
<tr>
<th>Year</th>
<th>No. students assessed</th>
<th>No. previous ITEP exams</th>
<th>Average score</th>
<th>Change from cohort 2003 (SE)</th>
<th>2003</th>
<th>2004</th>
<th>2005</th>
<th>2006</th>
</tr>
</thead>
<tbody>
<tr>
<td>2003</td>
<td>181</td>
<td>1</td>
<td>3.83</td>
<td></td>
<td>2</td>
<td>4.79</td>
<td>6.53</td>
<td>6.76</td>
</tr>
<tr>
<td>2004</td>
<td>285</td>
<td>2</td>
<td>2.70 (0.27)</td>
<td>0.96 (0.27)</td>
<td>2.70</td>
<td>4</td>
<td>8</td>
<td>2.92</td>
</tr>
<tr>
<td>2005</td>
<td>271</td>
<td>4</td>
<td>2.70 (0.27)</td>
<td></td>
<td>2.70</td>
<td>4</td>
<td>8</td>
<td>2.92</td>
</tr>
<tr>
<td>2006</td>
<td>264</td>
<td>8</td>
<td>2.70 (0.27)</td>
<td></td>
<td>2.70</td>
<td>4</td>
<td>8</td>
<td>2.92</td>
</tr>
</tbody>
</table>

$p = 0.0005$ $p < 0.0001$ $p < 0.0001$
Appendix A: ITEP Criteria Form

1. Identifies the medical problems and indicates the status
2. Briefly describes the pathophysiology and supports it with the complaints, symptoms and examination results of the patient
3. Evaluates current therapy and indications by comparing pathophysiology to the pharmacology
4. Describes patient data (pharmacokinetic, allergies, ADRs) that can influence therapy
5. Describes disease data (disease-therapy interactions) that can influence therapy
6. Describes drug data (dosing, regimen, interactions) that can influence therapy
7. Assesses patient compliance
8. Indicates plan for current drug therapy
9. Describes plan for non-pharmacological/surgical therapy
10. Chooses (if necessary) new drug therapy
11. Identifies correct dose, route, frequency
12. Provides rationale for drug, dose, route, etc.
13. Writes a complete prescription
14. Identifies monitoring parameters for toxicity
15. Identifies monitoring parameters for toxicity

16. Identifies monitoring parameters for toxicity
17. Identifies monitoring parameters for toxicity
18. Identifies monitoring parameters for toxicity
19. Identifies monitoring parameters for toxicity
20. Identifies monitoring parameters for toxicity
21. Identifies monitoring parameters for toxicity
22. Identifies monitoring parameters for toxicity
23. Identifies monitoring parameters for toxicity
24. Identifies monitoring parameters for toxicity

(+) ITEP does not meet the given criteria; ITEP requires changes. There are missing data or information is not understandable.
(v) ITEP mostly meets the given criteria; it requires only a few clarifications.
(+ ) ITEP meets the given criteria; it requires no changes and can be included in the chart of the patient.

References


