The effect of pharmacy information management system on safety medication use: A study from private hospitals in İstanbul

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ABSTRACT: Pharmacies located in hospitals are important units for the healthcare system. The aim of the study was to evaluate pharmacy information management system (PIMS) in the perspective of patient safety in private hospitals. In the study, PIMS related with medication safety and communication among health professionals and global patient safety were evaluated by manager pharmacists (n=104) working in private hospitals. Data was collected by the questionnaire for PIMS functions related with medication safety and communication among health professionals in the perspective of patient safety. In linear regression analysis, four items regarding “clinical warning system about medication interactions”, “supporting collaboration between physician and pharmacists”, preventing prescribing errors” and “increasing in reliability of patient’s data” were found to be predictive factors for patient safety in PIMS Consequently, a PIMS improves patient safety by preventing medication error.

KEY WORDS: Pharmacy information management system, patient safety, private hospitals

INTRODUCTION
Pharmacies are an important part of the health system that is highly complex environment involving many special trained health professionals working together effectively (1). Medications are essential for the prevention and treatment of disease (2) whereas they can also cause harm due to their adverse effects, medication errors and medication complexity (2) in health services (3). Preventable medication errors are prominent factors in patient safety since improving patient safety and quality of care has become a major focus in healthcare (4-6).

Patient safety could be improved by e-prescribing in the system (7) since errors with handwritten prescriptions such as difficulties with legibility and risk of misinterpretation are common problems in patient safety. Moreover, e-prescribing reduces medical errors such as selection of incorrect medication, dose, route, and formulation and phone calls between physician and pharmacists (8). When pharmacies adopt a patient care orientation by using information technologies based documentation, patient data are accessed and shared rapidly. Therefore, underuse of the current information technologies is the weakness for pharmacies. However, changes in communication patterns and workflow for health professionals, overdependence on technology, continuous demands for system upgrades, and negative emotions toward the technology are difficulties in the system (8). Although the occurrence of medication dispensing errors is risk factor for patient safety in pharmacies, the evaluations of patient safety related variables were limited in the frame of pharmacists using pharmacy information management system (PIMS) having positive effect on patient safety (9). Pharmacists as health care professionals focus on safe and effective medication use. They directly communicate physicians and other healthcare profession-
als during patient care in the hospitals. Therefore, the aim of the study was to evaluate the relationship between patient safety and PIMS in the perspective of pharmacists in private hospitals.

SUBJECTS AND METHODS
In this cross-sectional study, 104 pharmacists [F/M: 68/36, the mean age: 34.29 (SD:11.55) years] working in private hospitals (n=104) in Istanbul, Turkey, were included in the study. According to data of Social Security Institution, the number of private hospitals was found as 142. Response rate was calculated as 72.3% since the participation was voluntary in the study. One pharmacist was select in each hospital. The population of Istanbul, a province of Turkey is 18.3% of the total (13854740/75627384) (10). In Istanbul, the hospital bed capacity was 33.3 % of private hospitals (11).

Data was collected by a 10-item questionnaire examining PIMS functions related with medication safety and communication among health professionals. Patient related PIMS functions were searched from the literature and textbooks. Ten items were reviewed by our study group. Moreover, patient safety was also evaluated by an item “PIMS improves patient safety in medication therapy”. All items related with both PIMS and patient safety were coded by a 5-point Likert scale: 1: strongly disagree; 2: disagree; 3: neutral; 4: agree; 5: strongly agree).

Pearson correlations were carried out on the scores between PIMS items and an item for patient safety. Then, significant items were selected for linear multiple regression analysis. Chronbach-alpha value as internal reliability for PIMS item was found to be 0.835 that was high in the study group. Data was analyzed by using an SPSS 11.5 program (SPSS Inc, Chicago, IL).

RESULTS
Hospital bed capacity of private hospitals was 101.68(122.46) in the study group. The mean working time of pharmacists was 56.09(65.71) months in the study group. The number of prescription processed by pharmacists [90.52(99.00)/day] was weakly correlated with bed capacity (r: 0.3 p=0.025).

Scores of patient related PIMS functions were presented in Table 1. The highest three scores were seen in “It provides access information from physician offices to pharmacies” (4.51(0.94)) and “It supports collaboration between physician and pharmacists” (4.21(0.94)) and “It increases reliability of patient’s data” [4.21(0.73)].

In the present study, the highest patient safety related scores were observed in accessing medication list, effective communication among health professionals and reliability of patient’s data among PIMS items as a part of hospital information management system. Moreover, patient safety was related with warning medication interaction, collaboration between physician and pharmacists, preventing prescribing error, increasing reliability of patient’s data in the study.

Medication safety, health professional collaboration and design of care processes in the system are important parameters for pharmacists (14). In hospital information management system, computerized physician order entry is an application in which physicians write prescriptions online (12). Electronic prescribing is the direct computer-to-computer interaction of prescription information from physician offices to pharmacies in the system (7, 8, 15). In the pharmacist perspective, a PIMS makes the practitioners aware of non-safety medication usage, the prescribed overdose, the potential effect of the prescription of two drugs concurrently (9). The system can improve patient safety by reducing dispensing errors (e.g., incorrect medication, dose, or formulation or expired medication) (16) and inadequate doses, improper medication viewing medication interaction (17) in the hospital.

Patient safety could improve by using information technology and continuous control monitoring systems regarding re-engineering process in the medication ordering and delivery system (17). Physician ordering, transcription, dispensing and administration may originate medication errors steps (17). The highest incidence of error is seen in the medication ordering and administration stages (18). Therefore, collaboration of health professionals and increase in communication among

### Table 1: Function scores of PIMS

<table>
<thead>
<tr>
<th>PIMS Items</th>
<th>Mean</th>
<th>SD</th>
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<tbody>
<tr>
<td>1. It is well organized for patient’s information</td>
<td>4.19</td>
<td>0.76</td>
</tr>
<tr>
<td>2. It provides general view about medication list</td>
<td>4.03</td>
<td>0.95</td>
</tr>
<tr>
<td>3. It provides clinical warning system about medication interactions</td>
<td>3.7</td>
<td>1.22</td>
</tr>
<tr>
<td>4. It provides accessing general medication list</td>
<td>4.51</td>
<td>0.53</td>
</tr>
<tr>
<td>5. It increases time period for patient’s care</td>
<td>3.85</td>
<td>0.96</td>
</tr>
<tr>
<td>6. It supports effective communication among healthcare units</td>
<td>4.23</td>
<td>0.87</td>
</tr>
<tr>
<td>7. It supports collaborative activities among health professionals</td>
<td>3.94</td>
<td>0.94</td>
</tr>
<tr>
<td>8. It supports collaboration between physician and pharmacists</td>
<td>3.91</td>
<td>1.03</td>
</tr>
<tr>
<td>9. It prevents prescribing error</td>
<td>4.14</td>
<td>0.94</td>
</tr>
<tr>
<td>10. It increases reliability of patient’s data</td>
<td>4.21</td>
<td>0.73</td>
</tr>
</tbody>
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### Table 2: Results of linear regression analysis for patients safety

<table>
<thead>
<tr>
<th>PIMS Items</th>
<th>β</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>3. It provides clinical warning system about medication interactions</td>
<td>0.116</td>
<td>0.027</td>
</tr>
<tr>
<td>8. It supports collaboration between physician and pharmacists</td>
<td>0.368</td>
<td>0.000</td>
</tr>
<tr>
<td>9. It prevents prescribing error</td>
<td>0.236</td>
<td>0.006</td>
</tr>
<tr>
<td>10. It increases reliability of patient’s data</td>
<td>0.286</td>
<td>0.003</td>
</tr>
<tr>
<td>Constant</td>
<td>-0.286</td>
<td>0.130</td>
</tr>
<tr>
<td>R²: 0.831</td>
<td></td>
<td></td>
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**DISCUSSION**

Patient safety is a critical point in health services and quality of healthcare (12). This approach is based on Hippocratic Oath that the main principle is “no harm”. One of the most common types of medical errors thread patient safety is preventable medication error that is considered as an indicator of the patient safety in hospitals (13).
health professionals are critical points in patient safety. In this frame, organisational changes by using the technologies could affect that both the way work is done and how information is obtained and controlled. Therefore, change in work routines could be predicted among health professionals (17).

The main shortcoming of the study was that other healthcare professional’ perspective was not included because the main objective was to evaluate the system and safe medication use in the frame of pharmacist’s perspective in private hospitals. Since the participation of the study was voluntary, results were assessed in the study limits.

Consequently, it can be concluded that the PIMS improves patient safety by preventing medication error and increasing communication among physicians and pharmacists in the studied hospitals. These identifying factors are vital roles in daily practice for pharmacists in the limits of the study.

Eczane bilgi yönetim sisteminin güvenli ilaç kullanışına etkisi: İstanbul’daki özel hastanelerde bir çalışma


ANAHTAR SÖZCÜKLER: Eczane bilgi yönetim sistemleri, hasta güvenliği, özel hastaneler

REFERENCES


