Development and Validation of an Instrument to Assess the Perception of Pharmacy Students' on Medication Review Process

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ABSTRACT

Background: Drug related problems can be best prevented by the safe and appropriate use of medicines. A structured medication review conducted by a clinical pharmacist will assist the patient in overcoming the medication related problems. Pharmacist led medication review is a nascent activity in India, whereas in developed countries it has been in usual practice of the clinical pharmacist. Perception of the pharmacists has an impact in achieving the better medication review outcomes. Use of proper tools to assess the perception of pharmacy students' on medication review will help to identify the level of understanding, expectations and barriers in conducting this process. The present study was aimed to develop and validate an instrument (MeRPA) to assess medication review perception by the pharmacy students. A questionnaire with 13 items has been developed and the responses were collected from a sample of 209 pharmacy students using 5 point Likert Scale. The collected responses were statistically analyzed using SPSS 15.0. Reliability was assessed by calculating Chronbach's alpha and exploratory factor analysis was performed to evaluate the construct validity. All items in the questionnaire were appreciably agreed by the respondents except one item (Item 13). No significant difference in perception scores based on age, sex and course. The mean score of PharmD IV year students was significantly higher than PharmD II and III year students. [One-way ANOVA, P <0.05; Post hoc test: Tukey's test] Factor loading of MeRPA concedes three factors. Reliability of the items in questionnaire was found to be good. This study is the first of its kind in India to assess the perception of pharmacy students towards medication review using a standard instrument. This study throws light on students' perception towards medication review. Students had better and positive attitude towards medication review. Respondents had enough knowledge and about 96% of the respondents agreed to the necessity of conducting medication review by all clinical pharmacists. These results shows that medication review process can become a part of all the practicing pharmacists' responsibilities provided they were given with adequate training and resources.

Keywords: Medication review, Likert scale, Cronbach's alpha, factor analysis.

INTRODUCTION

Medications are useful in reducing morbidity and mortality of patients but sometimes it may be compromised due to the appearance of medication related problems. The appropriate use of medication is always necessary to make utilize in a safe way by preventing unnecessary side effects or drug related problems. The concept of inappropriate medication is observed especially in elderly people and polypharmacy prescriptions. Medication review, an important component of pharmaceutical care, is a systematic evaluation of patient's medicines and the related information with an aim of improving the outcome of medicine therapy by detecting, solving and preventing drug-related problems. Medication review is defined as “A structured, critical examination of the patients' medicines with the objective of reaching an agreement with the patient about treatment, optimizing the impact of medicines, minimizing the number of medication related problems and reducing the waste.” In simple words medication review is an emerging concept of medicine or medication therapy management. It is a pharmacist led service assists patients to manage their medication effectively.

All the patients prescribed with medication could get benefit out of medication review but prioritization should be done to benefit the patients who were in early need of such intervention. In some countries pharmacists led medication review programs were funded by the government agencies. Pharmacists are uniquely qualified in suggesting appropriate medication and resolving drug related problems through medication review. Usually Pharmacist led medication review (PLMR) were undertaken in collaboration with physicians to decide action plan for treating patients which helps in reduction of inappropriate drug use and improved health outcomes. Pharmacist recommendations from
medication review were accepted by the patients and implemented by the general practitioners helping to improve quality and control of treatment without significant change in drug costs.\textsuperscript{10,11} Studies revealed that pharmacy students through guided interview process were able to identify many drug related issues.\textsuperscript{12}

In the developed countries like Australia, United States and Canada medication review has been practiced as a part of pharmaceutical care programs.\textsuperscript{13} In the past, Indian pharmacy education was relatively industry oriented with most of the courses preparing students for an industry career. In the recent past Master level course in pharmacy practice was started and a few years back Doctor of Pharmacy (PharmD) course was started. These recent courses are focused on patient oriented practice including some course work on medication review.\textsuperscript{14,15}

Poor motivation, lack of time, knowledge and self-confidence were considered as barriers to conduct medication review. Similarly poor perception or lack of attitude was also found to be a significant barrier. Attitude of the pharmacists has an importance in achieving success of the medication review program.\textsuperscript{16} There is a need for valid and reliable instrument to assess the perception of medication review by the pharmacy students in the Indian setting. The present study was aimed to develop and validate an instrument to analyze the perception of medication review by the pharmacy students.

METHOD

Medication Review Perception Assessment (MeRPA) Survey Development

The MeRPA instrument was developed at Department of Pharmacy Practice, Manipal University, Manipal, India with the aim of assessing perception of medication review by the pharmacist. From the items generated through literature review, at about 30 items were screened after the brainstorming session. From the screened 30 items, through Delphi Technique at about 13 items were considered satisfying the criteria; Relevance, Appropriateness and Adequate. Likert scale (5 = Strongly Agree, 4 = Agree, 3 = Neutral, 2 = Disagree, 1 = Strongly Agree) is used to collect the item responses. Score ranges from 13-65.

Participants and survey process or Study Population and Survey administration

The study was conducted at Manipal University. Survey was conducted among students of PharmD, M.Pharmacy, B.Pharmacy (final year), who were taught with the clinical pharmacy concepts in their curriculum. Responses to items of the instrument were collected using Likert scale. In addition, data regarding age, sex, course and year of study were collected in this survey for instrument validation purpose.

Statistical Analysis

The collected data was analyzed through statistical Package for Social Sciences (SPSS 15.0, South Asia, Bangalore), (Descriptive and inferential statistical analysis). Demographics data were represented by frequencies and percentages. Mean and standard deviation of total scores for all the respondents were also determined. Associations between the demographic profile and responses were explored using Student’s t-test and one-way ANOVA with post-hoc test, Tukey’s test. A two-tailed significance level of 0.05 was considered as significant. The response statistics for each item with median and inter quartile range were also calculated.

Internal consistency of the responses to the items of MeRPA instrument was determined by calculating the Cronbach’s alpha. Reliability of the scale was assessed by calculating Cronbach’s alpha\textsuperscript{17}, inspecting partial alphas of each item, and determining the item to total correlations. Exploratory factor analysis was performed to evaluate the construct validity and to determine the number of factors in the MeRPA instrument. Principal component method was used to extract the factors. Exploratory factor analysis extracted three factors. After identifying the number of factors, the factors were subjected to rotation using Varimax rotation with Kaiser Normalization. Items with factor loadings greater than or equal to 0.4 were considered significant, and loadings of 0.5 or greater were considered ‘very significant’ and the Factors were labeled.\textsuperscript{19}

Results:

The survey collected responses from a total of 209 respondents from all the levels of pharmacy students. Respondents were equally distributed between males and female (50%) and majority of the respondents were in the age group of 21 – 25 (66.3%). Most of the respondents were from PharmD (41.1%), followed by M.Pharmacy (26.3%). There is no significant association among sex, age, course and year of the study in perception of medication review. Scores based on demographic variables (age, sex, and course) and their significance on perception of medication review is presented in Table 1.
There is a significant difference in the mean scores based on the year of education among particular level of education. The mean score of PharmD IV year students was significantly higher than PharmD II and III year students. There is no significant difference in perception between students of B.Pharmacy, M.Pharmacy, PharmD Post Baccalaureate (within the course) [One-way ANOVA, P < 0.05; Post hoc test: Tukey’s test]. Scores based on Demographic variable (year of education among particular level of education) and their significance on perception of medication review is presented in Table 2.

### Table 1: Demographic details of students (n=209)

<table>
<thead>
<tr>
<th>Variables</th>
<th>Number</th>
<th>Percentage</th>
<th>Mean</th>
<th>Std. Deviation</th>
<th>Significance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sex:</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>107</td>
<td>52.5</td>
<td>54.94</td>
<td>5.867</td>
<td>0.773 (&gt; 0.05)</td>
</tr>
<tr>
<td>Female</td>
<td>97</td>
<td>47.5</td>
<td>55.44</td>
<td>4.991</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>204</td>
<td>100</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Age:</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&lt;20</td>
<td>63</td>
<td>31.2</td>
<td>54.32</td>
<td>4.915</td>
<td>0.077 (&gt; 0.05)</td>
</tr>
<tr>
<td>21-25</td>
<td>134</td>
<td>66.3</td>
<td>55.42</td>
<td>5.693</td>
<td></td>
</tr>
<tr>
<td>&gt;26</td>
<td>52.5</td>
<td>59.60</td>
<td>59.60</td>
<td>3.050</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>202</td>
<td>100</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Course:</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>B.Pharmacy</td>
<td>39</td>
<td>18.7</td>
<td>53.77</td>
<td>7.165</td>
<td>0.163 (&gt; 0.05)</td>
</tr>
<tr>
<td>M.Pharmacy</td>
<td>55</td>
<td>26.3</td>
<td>54.76</td>
<td>4.485</td>
<td></td>
</tr>
<tr>
<td>PharmD</td>
<td>86</td>
<td>41.1</td>
<td>55.34</td>
<td>6.316</td>
<td></td>
</tr>
<tr>
<td>PharmD Post</td>
<td>29</td>
<td>13.9</td>
<td>56.93</td>
<td>4.636</td>
<td></td>
</tr>
<tr>
<td>Baccalaureate</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>209</td>
<td>100</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Table 2: Descriptive statistics and statistical significance

<table>
<thead>
<tr>
<th>Education (year)</th>
<th>Number</th>
<th>Percentage</th>
<th>Mean</th>
<th>Std. deviation</th>
<th>P –Value</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>B.Pharmacy</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>IV year</td>
<td>39</td>
<td>18.7</td>
<td>53.77</td>
<td>7.165</td>
<td></td>
</tr>
<tr>
<td><strong>M.Pharmacy</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>I year</td>
<td>48</td>
<td>23.0</td>
<td>54.55</td>
<td>4.652</td>
<td></td>
</tr>
<tr>
<td>II year</td>
<td>7</td>
<td>3.3</td>
<td>56.14</td>
<td>3.024</td>
<td></td>
</tr>
<tr>
<td><strong>PharmD</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>I year</td>
<td>26</td>
<td>12.4</td>
<td>54.92</td>
<td>3.908</td>
<td></td>
</tr>
<tr>
<td>II year</td>
<td>25</td>
<td>12.0</td>
<td>54.36</td>
<td>4.829</td>
<td></td>
</tr>
<tr>
<td>III year</td>
<td>18</td>
<td>8.6</td>
<td>53</td>
<td>10.12</td>
<td></td>
</tr>
<tr>
<td>IV year</td>
<td>17</td>
<td>8.1</td>
<td>60.19</td>
<td>3.038</td>
<td></td>
</tr>
<tr>
<td><strong>PharmD Post Baccalaureate</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>I year</td>
<td>10</td>
<td>4.8</td>
<td>58.3</td>
<td>4.877</td>
<td></td>
</tr>
<tr>
<td>II year</td>
<td>10</td>
<td>4.8</td>
<td>55.1</td>
<td>4.483</td>
<td></td>
</tr>
<tr>
<td>III year</td>
<td>9</td>
<td>4.3</td>
<td>57.44</td>
<td>4.362</td>
<td></td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>209</td>
<td>100</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
All items in the MeRPA instrument were agreed by more than 75% of the respondents except one item (Item 13), agreed at about 45.5% only. “Medication Review is necessary to be conducted by all clinical pharmacists” and “Medication Review is useful in improving communication with Patients as well as health care professionals” were agreed by more than 90% of the respondents. About 85% of the respondents agreed to “Medication review is a core requirement of pharmaceutical care”. More than half of the respondents disagreed towards the item “Medication Review requires lot of Time and Effort to learn and practice” (54.5%). Response summary statistics with median and inter quartile range were depicted in Table 3.

As a part of reliability assessment, Cronbach’s alpha for 13 item MeRPA instrument was found to be 0.815 based on non-standardized items and 0.82 based on standardized items.

Exploratory factor analysis gives three factors after extraction explaining cumulative variance of about 50.5 %. Individual contribution of the three factors was 32.45 %, 9.60 %, 8.46 % respectively. The items 4, 6, 7, 8, 9, 12 loaded under Benefit of MR (Factor 1); 10, 11, 13 loaded under Requirement of MR (Factor 2); remaining items 1, 2, 3, 5 were loaded under Professional Need of MR (Factor 3). Details of factor loadings and factors were given in Table 4.

### Table 3: Response statistics for individual items (n=209)

<table>
<thead>
<tr>
<th>Item No.</th>
<th>Item</th>
<th>Strongly Agree</th>
<th>Agree</th>
<th>Neutral</th>
<th>Disagree</th>
<th>Strongly Agree</th>
<th>Median (Interquartile range)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Medication Review is necessary to be conducted by all clinical pharmacists</td>
<td>132(63.16)</td>
<td>69(33.01)</td>
<td>6(2.87)</td>
<td>1(0.48)</td>
<td>1(0.48)</td>
<td>5(4-5)</td>
</tr>
<tr>
<td>2</td>
<td>Medication Review is professionally rewarding and valuable to one's career</td>
<td>76(36.36)</td>
<td>87(41.63)</td>
<td>36(17.22)</td>
<td>7(3.5)</td>
<td>3(1.44)</td>
<td>4(4-5)</td>
</tr>
<tr>
<td>3</td>
<td>Medication Review is useful in improving communication with Patients as well as health care professionals</td>
<td>118(56.46)</td>
<td>72(34.45)</td>
<td>15(7.18)</td>
<td>4(1.91)</td>
<td>0(0.00)</td>
<td>5(4-5)</td>
</tr>
<tr>
<td>4</td>
<td>Conducting Medication Review improves the intervening capability of pharmacist</td>
<td>108(51.67)</td>
<td>79(37.80)</td>
<td>19(9.09)</td>
<td>3(1.44)</td>
<td>0(0.00)</td>
<td>5(4-5)</td>
</tr>
<tr>
<td>5</td>
<td>Medication Review is a core requirement of Pharmaceutical care</td>
<td>96(45.93)</td>
<td>82(39.23)</td>
<td>23(11.00)</td>
<td>6(2.87)</td>
<td>2(0.96)</td>
<td>4(4-5)</td>
</tr>
<tr>
<td>6</td>
<td>Medication Review improves patient compliance and health status</td>
<td>102(48.80)</td>
<td>76(36.36)</td>
<td>26(12.44)</td>
<td>3(1.44)</td>
<td>2(0.96)</td>
<td>4(4-5)</td>
</tr>
<tr>
<td>7</td>
<td>Medication Review ensures safe and cost effective therapy to the patient</td>
<td>88(42.11)</td>
<td>83(39.71)</td>
<td>31(14.83)</td>
<td>6(2.87)</td>
<td>1(0.48)</td>
<td>4(4-5)</td>
</tr>
<tr>
<td>8</td>
<td>Medication Review optimizes polypharmacy prescriptions</td>
<td>75(35.89)</td>
<td>82(39.23)</td>
<td>39(18.66)</td>
<td>10(4.78)</td>
<td>3(1.44)</td>
<td>4(3.5-5)</td>
</tr>
<tr>
<td>9</td>
<td>Medication Review ensures appropriateness of therapy through detection and prevention of drug related problems</td>
<td>111(53.11)</td>
<td>71(33.97)</td>
<td>22(10.53)</td>
<td>1(0.48)</td>
<td>4(1.91)</td>
<td>5(4-5)</td>
</tr>
<tr>
<td>10</td>
<td>There is a need for Structured format to conduct Medication Review</td>
<td>105(50.24)</td>
<td>78(37.32)</td>
<td>22(10.53)</td>
<td>3(1.44)</td>
<td>1(0.48)</td>
<td>5(4-5)</td>
</tr>
<tr>
<td>11</td>
<td>There is a need of specific training to conduct and document medication review</td>
<td>2(44.02)</td>
<td>89(42.58)</td>
<td>23(11.00)</td>
<td>5(2.39)</td>
<td>0(0.00)</td>
<td>4(4-5)</td>
</tr>
<tr>
<td>12</td>
<td>Medication Review considers Medication History Interview (MHI) and Medication reconciliation to ensure therapeutic individualization</td>
<td>82(39.23)</td>
<td>89(42.58)</td>
<td>29(13.88)</td>
<td>6(2.87)</td>
<td>1(0.48)</td>
<td>4(4-5)</td>
</tr>
<tr>
<td>13</td>
<td>Medication Review requires lot of Time and Effort to learn and practice</td>
<td>39(18.66)</td>
<td>77(36.84)</td>
<td>69(33.01)</td>
<td>19(9.09)</td>
<td>5(2.39)</td>
<td>4(3-4)</td>
</tr>
</tbody>
</table>
The present study is an attempt to analyze perception of medication review by the pharmacists in India. An instrument (MeRPA) was developed to assess the medication review perception and the reliability and factor validity were tested. In a study conducted by MacIntosh et al a tool was developed to measure the pharmacist's attitudes and barriers of providing medication review. In this MacIntosh's study, Respondents agreed that Medication therapy management (MTM) services would be perceived valuable by patients, improves clinical outcomes. Survey results includes pharmacists are more appropriate to provide MTM service especially trained personnel. Respondents of the present study also expressed positive opinion on medication review service and considering it as necessary to be conducted by clinical pharmacists and useful in improving communication with patients and health care professionals.

In a study conducted by Latif and Boardman with a developed questionnaire to explore the attitude of community pharmacists towards medication use review service they found that pharmacists felt, lack of time and non-availability of support staff as barriers to medication review. Few respondents in the present study also felt the lack of time as a constraint. According to respondents of Latif and Boardman study respondents of the opinion, MURs were an opportunity for pharmacist to improve the skill, practice the profession and to provide better service to patients.

Respondents had excellent understanding on medication review process. No significant association was found between age, sex and level of education in perception of medication review. In this survey, the year of study had a significant impact in perception of medication review. PharmD IV year students had significantly better understanding on medication review process compared to final year B.Pharm, first year M.Pharm and second and third years of PharmD courses. As these students were the first batch in India, their eagerness and readiness to be a member of health care team, has led them to perceive the medication review at extreme levels.

Chronbach alpha value 0.82 explains that the reliability of the responses to the items was good. Three factors were emerged through factor analysis; named as Professional need of MR, Benefit of MR and Requirement of MR according to the items loaded under each factor.

The developed instrument can be used to assess the medication review perception. The reliability and construct validity of the instrument were found, which gives information regarding impact of motivation and clinical
courses on individual students, training need of medication review. The information from this study will be used for checking training needs.

**Limitations**

Medication Review Perception Assessment Instrument requires cross validation. Survey should be conducted in students and the working clinical pharmacists of various regions to strengthen the validity of the MeRPA instrument. Convergent validity was not assessed for this instrument.

**CONCLUSION**

This study is the first of its kind in India to assess the perception of pharmacy students towards medication review using a standard instrument. Respondents had enough knowledge to understand the medication review process outcomes. At about 96% of the respondents agreed to the necessity of conducting medication review by all clinical pharmacists. About 91% of respondents felt that medication review is useful in improving communication skills of pharmacist. These results show that medication review process can become a part of all the practicing pharmacists' responsibilities provided they were given with adequate training and resources.

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**References:**