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Improving clinical pharmacy's reputable medication reconciliation process

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Abstract
Clinical work units may be described using observable process activities, which are known as EPAs. In healthcare contexts, EPAs aid both students and instructors with evaluation. The goal of this project was to create and test an EPA that could be used in a clinical pharmacy environment by our students and pre-registration pharmacists here. There was a predetermined procedure for creating the clinical pharmacy EPA. The original draft was based on a quick literature study; a group of chemists, nurses and physicians worked together to develop it. The updated version was then double-checked by surveying Saudi clinical chemists online. The pharmacy students and trainees in Saudi Arabia were evaluated using an EPA that we developed, improved, and validated with respect to medication reconciliation. To back up the entrustment decision, a checklist was devised to go along with the EPA description. An online poll was carried out with 27 clinical chemists from various locations around Saudi Arabia to ensure its validity. Results from the Equal rubric quality test indicated that the EPA was satisfied. Specifically for the Saudi Arabian market, we created the first clinical pharmacy EPA. Given that chemists engage in medication reconciliation in a wide variety of therapeutic contexts, the term is well-suited to be considered by the EPA. Those pursuing degrees in pharmacy will be evaluated using the EPAs recently created and verified "Medication Reconciliation" exam.

Keywords: Pharmacy, students, EPAS, medication reconciliation, chemists

Introduction
The process of medication reconciliation is an essential part of clinical pharmacy. It involves comparing the prescription orders of a patient to all of the medications that the patient has been taking in an attempt to ensure the patient's safety. This method is essential because it allows for the detection of irregularities and the prevention of pharmaceutical errors that might result in adverse drug events (ADEs). It is necessary to continually improve the process of medication reconciliation in order to make it more dependable and efficient. This is a technique that is both crucial and difficult [1].

The process of medication reconciliation is a critical component of patient care, particularly during transitions in treatment such as hospital admissions, departmental transfers, and discharges. Because there is a possibility that patients may get information that is either partial or wrong during these transitions, patients are at a greater risk of making pharmaceutical medication errors. In order to guarantee that patients get the appropriate prescriptions regardless of where they are in the healthcare system, the purpose of medication reconciliation is to compile an accurate list of all drugs that patients are currently taking. This list should include the name of the drug, the dosage, the frequency, and the mode of administration. Through the establishment of criteria for accuracy and consistency in the administration of drugs, this systematic technique contributes to the reduction of adverse drug events and the improvement of individual patient outcomes [2].

Despite the fact that medication reconciliation is an essential process, it is now confronted with a number of challenges. Problems with the patient, such as forgetfulness or language barriers, as well as system concerns, such as incompatibility across electronic health records (EHRs), may make it difficult to get a complete and accurate medication history. In addition to being labor-intensive and time-consuming, the technique may also need the collaboration of several healthcare experts, including specialists in the fields of medicine, nursing, and chemistry. Patients are at a greater risk of experiencing injury as a result of discrepancies that are brought about by incorrect or insufficient medication histories [3].

It is possible to prevail over these challenges by using any one of the several approaches that are available for improving the drug reconciliation process. Increasing the precision of data and simplifying processes via the use of technology is one method that has shown to be beneficial [4]. The integration of electronic health records (EHRs) across a variety of healthcare settings is one method that may be used to enhance the transmission of information and reduce the likelihood of individuals making errors. In addition, clinical decision support systems (CDSS) may be of assistance to healthcare practitioners in their attempts to discover potential interactions and inconsistencies in a more efficient manner [5]. Expanding the education and training opportunities available to healthcare professionals who are taking part in the process is yet another crucial strategy. The provision of comprehensive training on the procedures for medication reconciliation to each and every employee is one method that may be used to enhance the authenticity of medication histories. "It is possible that the outcomes might be improved by educating patients about the value of maintaining an accurate prescription list and encouraging their active involvement in the process of maintaining medication reconciliation [6].

Research Methodology

We used a multi-stage process for developing the EPA. Among these steps was

1. Choosing the right specialists.
2. Determining appropriate therapeutic interventions.
3. A literature review that is both quick and thorough, doing both at the same time.
4. Incorporating results into the EPA framework.
5. EPA improvement.
6. Assessment and validation by online survey and inter professional consensus group.

Choosing of specialists

The creation of the EPA required the competence of two distinct fields of study: first, clinical pharmacy, with hands-on experience in a hospital environment; and second, EPA methodology. Involvement from medical physicians and nurses was also desired, since the EPA was designed for use on an interdisciplinary training ward. We choose to include clinical chemists from both rural and urban hospitals throughout Saudi Arabia in order to acquire a representative sample of specialists and to integrate their distinct perspectives on clinical operations.

Quick review of the literature and simultaneous work analysis

A combination of preexisting local SOPs and standards for the chosen activity and a quick literature search allowed for the prompt identification of the most important works on the subject. The clinical pharmacists also conducted a job analysis that revealed the real tasks and subtasks that the chosen EPA candidate needed.

Including the results in the EPA framework

Each of the eight parts was filled up using the findings of the quick literature review and work analysis, following a previously stated EPA format.

Table 1: Ten Cate's description of the common EPA structure

Section	Description
1.	Headline
2.	Details and restrictions
3.	Possible dangers in the event of an error
4.	most important areas of expertise
5.	Knowledge, abilities, dispositions, and experiences necessary for summative evaluation
6.	Sources of information to evaluate development and encourage summative assignment
7.	Expected degree of supervision/entrustment for training level
8.	Time until expiry if it is not used

Refinement and certification of EPA

There were two separate phases to the EPA's improvement process. To begin, the proposed EPA was reviewed by an interdisciplinary consensus committee. Adherence to EPA methodology was the primary emphasis. Seven specialist made comprised the inter professional consensus committee.

Each member of this panel either had theoretical understanding of EPA development methodology or had relevant clinical experience. One doctor, three nurses, two clinical chemists, and one educational specialist made up the team of experts. Members of the interdisciplinary consensus group convened virtually. Using the Equal rubric as a framework, we planned our group discussion topics. The proposed EPA was subject to questions designed to test its thoroughness and readability. With everyone's permission, the meeting was videotaped for later review and analysis. Furthermore, the proposed EPA and EPA checklist were annotated live throughout the conference with comments. After the group discussion, the finalized EPA version was sent out to be validated by an online poll.

After that, a poll was conducted online with clinical chemists to ensure external and clinical validity. Clinicians practicing medicine at a Saudi medical facility were considered for inclusion. More than 2,500 chemists working in Saudi hospitals were included in the email list that was used to send out survey invitations.

The survey was divided into three parts:

1. Improving and confirming the EPA claim.
2. The standard of the EPA.
3. Population makeup.
4. You may request the whole survey at any time.

Table 2: Items with Equal Rubric, divided into three groups. Item exclusions are detailed below

S. No.	Item
1.	There is a distinct beginning and conclusion to this EPA.
2.	This EPA may be carried out individually to provide a specific clinical result.
3.	This EPA is targeted and concentrated.
4.	This EPA may be seen in action.
5.	This EPA has a quantifiable result.
6.	The work described in this EPA is crucial and significant to the field.
7.	Completing this EPA results in a product or consequence of work that is acknowledged.
8.	Only professionals with the necessary qualifications may use this EPA in therapeutic settings.
9.	The professional job that may be entrusted is covered by this EPA.
10.	The application of knowledge, skills, and/or attitudes (KSAs) obtained via training is required by this EPA.
11.	The application and integration of many fields of knowledge are part of this EPA.
12.	This EPA does not use any adjectives (or adverbs) that allude to proficiency; instead, it defines a job. Items Not Included in the Original Rubric
13.	Within the framework, this EPA is easily identified as different from other EPAs.
14.	The EPA term refers to a task rather than a learner's attributes or skills.

The clinical pharmacists were requested to analyze the comprehensiveness of certain EPA parts and provide their thoughts on the practical use of EPA as an evaluation tool in the first part of the document, which deals with the improvement and validation of the content. Several writers have suggested the equal rubric as a reliable way to assess EPA quality, therefore we utilized it for that purpose in Section 2 of the poll. All of the items in Equal's criterion-based tool employ descriptive anchors. Fourteen components make up the first rubric. We used a slightly modified version for our project; it has twelve components split over three subscales: Questions 1–5 deal with EPA in isolation, highlighting its outward structure (e.g., "This EPA has a clearly defined beginning and end"). In items 6–9, the EPA is mentioned as a vital, crucial, and entrust able duty of the profession. Lastly, the purpose of items 10–12 is to assess EPA's usefulness and impact as a teaching tool for the trainees. Table 2 displays all of the items. A functional assessment of chronic illness therapy (FACIT) translation approach was used to translate the rubric from English to Arabic. Section 3 of the survey inquired about socio-demographic factors such as gender, age, occupation, level of education, and job experience.

EPA evaluation checklist

Based on the EPA description, two clinical pharmacists developed an EPA checklist. Next, a panel of seven foundation chemists working at our hospital were asked to test the checklist. All items representing individual actions for 10 observations were tested for inter-rater reliability using two evaluators.

Examining data statistically

The survey data was imported into Excel (16.69.1) for statistical analysis. Output: I-CVI, UA, S-CVI/Ave, and S-CVI/UA, all of which are item content validity indexes and universal agreement scores, respectively. An acceptable CVI was defined as having a minimum value of 0.78. A significantly modified version of the equal rubric was used to analyze the EPA's quality. A scale from 1 to 5 was used to score each item on this rubric. A total of twelve items were used to determine the average, including the three subscales. To indicate excellent EPA quality, a cutoff score of 4.07 or above was established.

Results

Choosing of experts

After sending out invitations via the ADKA email list, 34 clinical chemists participated in the online survey; seven were not included since their data was insufficient. Despite the small sample size (27 experts altogether), every one of Saudi Arabia's federal states was well-represented.

Quick review of the literature and simultaneous work analysis

In order to find publications and activities that were relevant to medication reconciliation, we used a mixed-methods approach. We looked for articles on medication reconciliation published in Arabic or English between 2013 and 2023 using PubMed and Google Scholar. We focused on articles that described the procedure. The internet catalogue was also searched. The quick literature review identified a total of fourteen sources. Additionally, we included the preexisting "Medication Reconciliation (Med Rec)" SOP from hospital pharmacy. Three clinical pharmacists from the who have worked on medication reconciliation projects before met to discuss the procedure and come up with a timeline for the necessary stages.

Including the results in the EPA framework

Ten Cate outlined eight components that comprise an EPA. Singular standard operating procedure the construction of the EPA's content was based on Med Rec and the Best Possible Medication History defined by the WHO. Using Saudi and Swiss learning target catalogues, Section 5 of the EPA framework was filled up. For the purpose of identifying acceptable attitudes, we also looked to the World Health Organization's recommendations on good pharmacy practice. The relevant framework, similar to Can MEDS's medical responsibilities, was filled up in Section 4. Section 2's restrictions were further defined with the aid of the ISMP List of High-Alert Medications. Sections 2 and 5 were augmented by our work analysis.

Refinement and certification of EPA

For every question, researchers found an item content validity index that fell somewhere between 0.81 and 0.89. No universal agreement was found, with an S-CVI/Ave of 0.87 and an S-CVI/UA of 0.00. However, the computed values are higher than the target of at least 0.78.

Table 3: Calculated content validity indices for EPA 'Medication Reconciliation'. In this case, the questions originated in Saudi.

Question	Experts in Agreement	UA (universal agreement)	I-CVI
F to me, this EPA encompasses all the essential competencies that the student has to possess in order to be capable of taking a pharmaceutical history.	24	0	0.89
The necessary tasks and content summaries of my pharmaceutical history are included in the current EPA.	24	0	0.89
In my opinion, this EPA encompasses all the essential information that a student needs to know in order to be able to complete a medication history.	22	0	0.81
This EPA, in my opinion, addresses every crucial behavior that a student has to exhibit in order to be qualified to collect a medication history.	24	0	0.89
	S-CVI/Ave	0.87	
	S-CVI/UA	0.00	

Direct and concentrated observation with an accompanying checklist was selected by 62.96% of survey takers as their favorite method of evaluation. A total of 22.22 percent of respondents were in support of basing their evaluation of the completed medication plan on the results of the medication reconciliation. A feedback discussion had the lowest level of support, at 14.81%. The survey participants were split on the frequency of EPA assessment. Half of them (51.85%) preferred to repeat the evaluation 4-6 times to determine whether the learners were capable of doing the activity, while almost half (48.15%) thought that 2-3 times was sufficient. In light of this, we choose to provide an evaluation for on four separate occasions in our EPA description.

The results of the participants' votes for the projected LoS based on the participants' respective training levels as undergraduates, foundation pharmacists, and licensed pharma-cists. So, we settled on LoS 1-2 as the minimum requirements for foundation pharmacists, and LoS 1-2 as the minimum for undergraduates. This EPA should be performed by licensed chemists at LoS 3-5, taking into account their level of expertise.

Table 4: Conclusions on an appropriate Level of Supervision (LoS) that are experience-based. People who took the survey (n = 27) had the option to choose several appropriate Loss.

LoS	Undergraduate student	Foundation pharmacists	Licensed pharma- cist
'Not authorized to take action"	70.37%	11.11%	7.41%
'Permission to behave in an unsupervised remote manner (not immediately accessible)"	0	29.63%	88.89%
'Permission to function under oblique supervision; not present yet promptly accessible when required."	7.41%	85.19%	74.07%
Permission to function under proactive monitoring in the presence of direct supervision	66.67%	48.15%	22.22%
'authorization to oversee less experienced trainees"	9%	0	29.63%

Out of all the poll questions, 59.26% were on the frequency of the EPA summary assessment's "expiration date," or how frequently it should be repeated. A significant majority of 77.78% expressed agreement when asked whether this EPA may be used as an evaluation tool in their daily clinical practice. These findings informed revisions to the appropriate EPA sections (the final version is accessible as supplemental data). Table 5 displays the equal rubric findings. With a mean score of 4.22 (SD 0.87), the overall quality was excellent.

Table 5: The equal tool for EPA medication reconciliation was used to establish the results of the EPA quality calculations. Abbreviations: SD for standard deviation and SEM for standard error of the mean

Item	Mean	SD	Item		Mean	SD	SEM
There is a distinct beginning and conclusion to this EPA.	4.6	1.0	1–5	Discrete activity	4.16	0.97	0.084
This EPA may be carried out individually to provide a specific clinical result.	3.5	1.1					
This EPA may be seen in action.	4.4	0.8					
This EPA is targeted and precise.	4.4	1.0					
This EPA has a quantifiable result.	3.9	0.7					
The work described in this EPA is crucial and significant to the field.	4.1	0.9	6–9	Entrust- able, es-	4.32	0.81	0.078
Completing this EPA results in a labour output or outcome that is recognized.	4.4	0.7					
Only those with the necessary qualifications are permitted to use this EPA in therapeutic settings. 9. Professional work fit for entrustment is covered by this EPA.	4.1 4.7	0.8 0.7		Essential, and important task of the profession			
The application of knowledge, skills, and/or attitudes (KSAs) obtained via training is required by this EPA.	3.7	0.9	10–12	EPA as Education	4.17	0.77	0.086
The application and integration of many fields of	4.5	0.6		al Tool			

knowledge are part of this EPA.							
This EPA does not use any adjectives (or adverbs) that allude to proficiency; instead, it defines a job.	4.3	0.6					
Total Points		4.22	0.87	0.048			
Range of scores		3.3 – 4.8					

Checklist for the EPA

There were three main groups of observable actions in the final EPA checklist (supplementary data):

1. Patient interview.
2. Putting together the prescription schedule and related paperwork.
3. Mentality.

Several actions were included in each observable area, and they were assessed on a supervisory scale from 1 to 5. If an action is not noticed, the option "not applicable" might be selected. Two clinical pharmacists served as independent raters and assessed ten observations of foundation pharmacists doing prescription reconciliations in the course of their everyday job." A total Cohen's Kappa of 0.83 was determined, showing near-perfect agreement. The structural evaluation that resulted from using this checklist shed light on the trainee's present performance level. The average score that is calculated from the checklist is a great way to see how far down the learning curve the student is.

Discussion

Following the conclusion of the investigation, it was decided that the process of medication reconciliation upon hospital admission would be an excellent clinical activity for an EPA working in clinical pharmacy. By adhering to a predetermined development plan, we were able to not only construct but also verify the EPA Medication Reconciliation for Saudi pharmacists and pharmacy students.

Instead of conducting a laborious and resource-intensive Delphi survey, which was preferred by some, we could base the EPA description on the local standard operating procedure (SOP). This would enable us to conduct a literature study in a quick and efficient manner, which would ultimately result in a more refined and comprehensive EPA draft. In light of the fact that there is no established standard for the development of EPAs in a clinical pharmacy context, we came up with a route suggestion [7] and it was used in the process of generating this EPA.

The interprofessional consensus group was responsible for providing the information for patient risks, as well as the relevant CanMEDS domains that could be applied to a clinical pharmaceutical environment (for example, "pharmaceutical expert" and "communicator"), as well as the part on anticipated knowledge, abilities, and attitudes. By including the viewpoints of a variety of professionals, we were able to craft an EPA description that was both exhaustive and complete. One of the advantages of being able to use a consensus group discussion was that any issues could be handled in a short amount of time.

Utilising local experts for the purpose of providing a more "personalised" and hospital-specific EPA description proved to be beneficial. These specialists are individuals who are familiar with the procedures that take place inside the clinic. Additionally, the consensus group made it feasible to generate the EPA description and checklist in a rapid and effective manner, all while taking into consideration the average amount of work that healthcare practitioners have to do and the limited amount of time they have available. The first iterations of the Environmental Protection Agency's definition were backed by a number of clinical pharmacy activities that were based on recommended standards and standards of practice. During the process of refining, it is necessary to incorporate local experts who are knowledgeable in the therapeutic activity that has been chosen. For our particular case, the local professionals offered further information about the requirements for the essential specification as well as the limitations of the medicine reconciliation process [8].

During the discussion of the entrustment decision and the following definition of LoS, both the online survey group and the interprofessional consensus group provided their perspectives. Because we were able to identify distinct target participants for the EPA, such as students, nurses, foundation pharmacists, and fully licenced pharmacists, we made the decision to provide two alternatives for the entrustment decision. One of these alternatives was ad hoc, and the other was summative [9].

This decision was made in accordance with the EPA description, which can be found in the supplemental data. An ad hoc entrustment decision might be used for a fast assessment that only has limited data, such as a single observation with the use of a checklist or a review of the prescription plan. Through the use of these distinct varieties of assessment, it is feasible to discriminate between the various participants who are the target audience. It is possible to use the ad hoc technique to assess a clinical chemist with extensive expertise who is returning to medication reconciliation [10].

The summative entrustment decision may be more appropriate for students and foundation chemists due to the fact that it is based on a long-term review that incorporates several sources of information with multiple perspectives. The Environmental Protection Agency (EPA) may be beneficial to a wide variety of hospital wards and patients. As previously indicated in the restrictions section of the EPA description, patients who are suffering from certain ailments need greater supervision by a chemist in order to ensure their safety during the operation. It's possible that EPAs might be useful as a mechanism for feedback [11].

Learners (also known as students and trainees) may have a notion of what is expected of them in terms of their knowledge, skills, and behaviour prior to the assessment. When carrying out an assessment, it may be beneficial for both the student and the assessor to make use of an EPA checklist in order to identify areas in which the learner's knowledge is deficient. It is possible that this will then assist in shaping and strengthening their plan for continuing their education and advancing their career. It is also possible to apply EPA in a multi-source feedback or assessment presentation; however, this will depend on the architecture of the relevant trust or employer.

In spite of the fact that EPAs are often described as being highly reliant on the context in which they are used [12], we continue to assert that EPAs are transferable to a certain

degree. In the case of the Environmental Protection Agency (EPA), for instance, modifications would be necessary in the specification section since it illustrates the chronology of clinical activities, which might differ from one clinical specialty or institution to another. As we discovered over the process of developing our EPA, several health care providers may be engaged in a variety of clinical tasks within the same clinical setting. As an example, whereas other Saudi hospitals make use of pharmacy technicians to do medication reconciliation, the work is carried out by clinical pharmacists and pre-registration trainees in the aforementioned hospital. As a result of the fact that some of the people who participated in the online poll requested pharmacy technicians to be included in the description, it is essential to adapt EPAs to the local situation. Taking into consideration the amount of time and work that is necessary to construct an EPA, it seems that making alterations is an acceptable technique to adapt it for usage in diverse environments.

Conclusion

As far as we are aware, this report is the first of its kind to detail a clinical pharmacy activity in Saudi Arabia. Several clinical settings are using the EPA Medication Reconciliation as an evaluation tool at the moment. Any lingering questions regarding its applicability might be allayed by a field validation employing an ethnographic qualitative design similar to an inter professional training ward.

The clinical pharmacy profession in Saudi Arabia needs more EPAs in the future, taking a page out of medical education's playbook. It is necessary to evaluate clinical pharmacists' competences due to the growing number of clinical pharmacists and the variety of clinical pharmacy services they provide. It would seem that EPAs are the right instruments for the job. If we want more EPAs developed that are up to par with what's suggested in the literature, we need to set up a process that is simple, fast, and standardised.

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