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EPAs for clinical surgical teaching skills for undergraduate medical and dental clinical teachers

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***Abstract*---**Objectives: To develop desired EPAs for clinical surgical teaching skills of medical/dental teachers teaching surgery to undergraduates (knowledge, skills and attitude) through expert consensus. Methods: This study was conducted as an online and one-to-one consensus survey, It involved the experts meeting inclusion criteria serving as clinical teachers teaching surgery to

undergraduates. They serve in undergraduate and postgraduate institutes across the twin cities. For this study, the modified Delphi technique was conducted in three stages. Firstly, an extensive literature search was made to identify various components to design EPAs. In the second stage, face validation was done by a small sample of clinical teachers who were teaching surgery to undergraduates. Two iterative rounds of modified Delphi formed the third stage of the study. Achieving the consensus was set as the criteria for terminating the rounds at the end of the second round. Results: After a thorough literature search, a questionnaire was made which comprised of 7 EPAs, their subsequent 57competencies, different assessment strategies along with supervision levels. It was evaluated by a group of clinical teachers who teach surgery at the postgraduate and undergraduate levels. They graded each competency on a Likert scale. They gave qualitative feedback also. 57 competencies along with 7 EPAs as well as assessment strategies, levels of supervision and suggested expiration times for the round one questionnaire of the Delphi study were finalized. Round I questionnaire was filled by 30 experts. Analysis of Round I was done in lines with the already defined consensus criteria. Items having 80% or more consensus as extremely or very important, with a median of 4 and inter quartile range 1 were included. For supervision levels and assessment strategies an agreement response of 80 percent or more on a specific level, was the criteria. Almost all competencies reached 80 % agreement and median of ≥ 4 and inter quartile range ≤ 1. In Round II, the Round I questionnaire was sent to 20 experts who had consented to participate in Round II, any new competency was not suggested. Analysis of Round II results was also done on the same predefined criteria of Round I. At the end of Round II, a set of 7 EPAs with 46 competencies as well as assessment strategies, aiming for supervision Level 5 “Provide supervision to junior trainees” were identified after expert consensus and response stability. Conclusion: The study developed 7 EPAs with 46 competencies for surgical teaching skills of surgical teachers all aimed at supervision “Level 5” along with various assessment strategies.

***Keywords*---**entrust able professional activities, clinical teaching competency-based education, surgicalskills assessment, teaching surgical skills, modified Delphi study.

Introduction

Medical education is a dynamic and continuously evolving field. Teaching is both an art and science.[1] A reassuring fact, however, is that art and science can be learned. It has been recognized that being an effective teacher stresses a suitable approach to teaching in combination with professionalism in work. In clinical educational settings, both the clinical and theoretical aspects of the field or discipline must be taught effectively.[2] Many faculty members start the teaching profession with no previous experience and they mostly rely on the naive hope that we might

be effective instructors because of our clinical experience. Clinical teaching is supposed to be inspirational, supportive, actively involving and having communication with students. Teaching surgery to undergraduate students is a topic that has been rarely touched upon.[3] When a teacher teaches surgical steps or guides surgical skill development it requires complementing the students and discipline. Earlier, there was a lack of formal training for surgical teachers; they simply used to learn by teaching or by informal experiential learning. It thus becomes of vital importance that this deficiency be addressed.[1] It may involve a comprehensive assessment of surgical teaching skills of teachers who teach surgery at the undergraduate level in the form of entrustment decisions or EPAs. Entrustable professional activities (EPAs) are tasks of a specialty or subspecialty that a professional in individual capacity can perform without direct observation or supervision in a given point of time.[4]

Medical teachers teaching at the undergraduate level, in general, have to fulfill several roles i.e. lecturer, clinical teacher, on-the-job role model, facilitator, mentor, students assessor, curriculum assessor, curriculum and course planner, resource material provider and study guide producer.[5] Thus, teachers require appropriate guidance and assistance in developing their teaching skills and learning about the theories underlying principles of adult learning. The aim of the study was to develop desired EPAs for clinical surgical teaching skills of medical/dental teachers teaching surgery to undergraduates (knowledge, skills and attitude) through expert consensus.

Methodology

This study was conducted as an online and one-to-one consensus survey; it involved the experts meeting inclusion criteria serving as clinical teachers teaching surgery to undergraduates. They serve in undergraduate and postgraduate institutes across the twin cities. For this study, the modified Delphi technique was conducted in three stages. Firstly, an extensive literature search was made to identify various components to design EPAs. In the second stage, face validation was done by a small sample of clinical teachers who were teaching surgery to undergraduates. Two iterative rounds of modified Delphi formed the third stage of the study. Achieving the consensus was set as the criteria for terminating the rounds at the end of the second round. Ethical approval was given by IRB committee of Zia ud din medical college, the current study was conducted for 6 months from January 2023 to June 2023.'Experts' will be defined as consultants and general practitioners in different fields who are involved in the clinical teaching of surgical skills either full or part-time. In Delphi studies, participants are selected for the purpose to have relevant individuals in the expert panelwho are knowledgeable about a specific topic. Purposive sampling is used in Delphi studies,so it was preferred in this study. The main aim was to protect the quality of analysis by ensuring that amount of data was manageable as well as to produce a sample that can be logically assumed to be representative of our population. Only those Consultants were included who were in different fields of medicine, surgery and dentistry and were actively involved in clinical teaching/teaching of surgical skills.

Results

The questionnaire formulated after a literature search with 7 identified EPAs, their 57 competencies, required supervision levels and assessment strategies was sent to 45 consultant teachers meeting inclusion criteria. Thirty of them participated by completing the first-round questionnaire. Experts were included from all provinces of the country. All participants were at least Assistant Professors with a minimum teaching experience of five years in surgery/teaching surgical skills at the undergraduate level.

S. No	Designation	Academic Qualification	Specialty	Gender	Teaching Experience (Years)	Place of work	Country
1.	Assistant Professor	BDS, FCPS	OMFS	M	2	Public Teaching Hospital	Pakistan
2.	Assistant Professor	MBBS, FCPS.	Gynecology	F	9	Public Teaching Hospital	Pakistan
3.	Assistant Professor	MBBS, FCPS,	General Surgery	M	5	Public Teaching Hospital	Pakistan
4.	Assistant Professor	BDS, MCPS	Periodontology	F	5	Public Hospital	Pakistan
5.	Professor	MBBS; FCPS	General Surgery	M	20	Public Teaching Hospital	Pakistan
6.	Assistant Professor	MBBS; FCPS, MHPE	OMFS	F	5	Public Teaching Hospital	Pakistan
7.	Assistant Professor	BDS,	Pediatric dentistry	M	5	Private Teaching Hospital	Pakistan
8.	Associate Dean	BDS, FCPS	OMFS Medical Education	M	20	Public Dental College	Pakistan
9.	Professor	BDS, MFDS	OMFS	M	12	Government hospital	Qatar
10.	Associate Professor	MBBS, MCPS, FCPS	Gynecology	F	11	Private Teaching Hospital	Pakistan
11.	Assistant Professor	BDS, MSc	Pediatric dentistry	M	5	Private Teaching Hospital	Pakistan
12.	Assistant Professor	FCPS, 5 years	Gynecology	M	5	Private Teaching Hospital	Pakistan
13.	Professor	BDS, MCPS, FCPS,MCPS- HPE	Prosthodontic	M	20	Public Dental College	Pakistan
14.	Assistant Professor	MBBS, MCPS, MSc	OMFS	F	5	Public Teaching Hospital	Pakistan
15.	Professor	MBBS, FCPS	General Surgery	M	13	Public Teaching Hospital	Pakistan

Table **Error! No text of specified style in document.**-1: Demographics Round 1 items with Results

Experts graded the competencies in each of the EPAs for the importance on a 5-point Likert scale from “extremely important to not at all important.” As per consensus criteria already defined, items with 80percent or more consensus as extremely or very important,medianof≥4 and inter quartile range ≤ 1 was selected. For supervision level, the inclusion criterion was an agreement response of 80 percent or more on a specific level (from level 1 to level 5). Experts were also required to mark the relevant assessment strategies for each EPA for percentage ranking. An additional question regarding experts ’opinion on the expiration of EPA’s was also sought. Experts’ opinions for Round I regarding the importance of individual competencies in the EPAs and the suggested supervision level are shown in the Table shown below

Assessment Strategies									
EPAs	Peer assessment against set criteria	Peer group reflection	DOPS	OSTE	Self-assessment tools	360 feedback	Student feedback	OSATS	portfolio
EPA 1	20.0%	13.3%	0.0%	13.3%	6.7%	10.0%	30.0%	6.7%	0.0%
EPA 2	10.0%	23.3%	10.0%	13.3%	36.7%	0.0%	6.7%	0.0%	0.0%
EPA 3	0.0%	0.0%	53.3%	13.3%	10.0%	10.0%	6.7%	6.7%	0.0%
EPA 4	0.0%	0.0%	23.3%	23.3%	10.0%	13.3%	16.7%	13.3%	0.0%
EPA 5	36.7%	0.0%	13.3%	6.7%	10.0%	23.3%	10.0%	0.0%	0.0%
EPA 6	3.3%	0.0%	36.7%	10.0%	0.0%	30.0%	20.0%	0.0%	0.0%
EPA 7	3.3%	0.0%	0.0%	40.0%	10.0%	20.0%	26.7%	0.0%	0.0%

Table 2: Individual competencies in the EPAs

MEAN	MEDIAN	SD	IQR
3.33	3.00	2.708	2.00
3.33	3.00	3.464	4.00
3.33	2.00	4.690	3.00
3.33	4.00	2.667	5.00
3.33	3.00	3.464	4.00
3.33	1.00	4.055	6.00
3.33	1.00	4.137	6.00

Table 2: Assessment strategies

To confirm the stability of responses for those competencies which had reached 80 percent or more consensus in both rounds, the Mc Nemar change test was applied. The Mc Nemar test is a non-parametric statistical test that can be used with data sets that have a sample size of less than 30 and compute the p-values (Adedokun and Burgess2012).To apply the test, the expert's responses for the competencies in both rounds were changed to a dichotomous scale. McNemar test showed stability of responses with p value>0.05.

Table 4: Competencies in both rounds using McNemar test with p-value >0.05

	EPA1: ROLE MODELLING	
	Competencies related to Knowledge	p-value
1	Assess the overall medical condition of the patient, including a complete history, current condition, co-morbidities, treatment options, and prognosis	.09
2	Describe the indications, benefits, risks, alternatives, and potential complications of the surgical procedure.	0.11
3	Describe the preparation required for the surgical procedure.	0.9
Competencies related to Skills		
4	Obtain informed consent from the patient.	Cannot be computed because 2 data sets are exactly the same

5	Document the discussion and informed consent appropriately in the file of the patient.	0.4
6	Perform clinical /surgical demonstrations carefully and responsibly.	0.7
Competencies related to attitudes		
7	Communicate effectively with the patient/family and ensure their understanding of the indications, risks, benefits and potential complications of the procedure in presence of students	0.17
8	Understands personal limitations and seeks help as needed	0.07
9	Appreciate the patient's opinion, concerns, and apprehension	0.04
10	Interact positively with patients and encourage students to do so.	0.04
11	Enthusiasm for their profession Deliberate display of role modeling to create a positive learning environment/use strategies for deliberate positive role-modeling	0.04
	EPA -2: FEEDBACK	
	Competencies related to knowledge	
12	Justify an evidence-based approach for choosing the most appropriate model feedback according to the situation	0.02
13	Identify and interpret the situation not the person	0.02
14	Prioritize the issues learner can control	0.20
	Competencies related to skills	
15	Adapt evaluative feedback over descriptive feedback	0.07
16	Demonstrate understanding and kindness towards students	0.02
	Competencies related to attitudes	
17	Be ethical while giving feedback	0.07
18	Appreciate the positives	0.09
19	demonstrate composure while giving feedback	1.00
20	Maintain dignified and respectful environment.	0.04
	EPA-3 Surgical Scrubbing	
	Competencies related to knowledge	
21	Define and describe surgical scrubbing	1.00
22	Describe types of surgical scrubbing	0.03
	Competencies related to skills	
23	Demonstrate pre scrub wash	1.00
24	Demonstrate scrub techniques with specific duration	1.00
	Competencies related to attitudes	
25	Advocate the importance of pre scrub wash for patient safety	1
	EPA 4: GOWNING AND GLOVING	
	Competencies related to knowledge	
26	Describe the gowning and gloving technique to students with help of a non-scrubbed assistant	0.625
27	Describe the purpose and parameters of gowning and	0.04

	gloving	
28	Enlist general principles of gowning and gloving	0.07
	Competencies related to skills	
29	Demonstration of gowning and technique	0.625
30	Demonstration of closed glove technique	1.00
31	Demonstration of open glove technique	1.00
32	Practice theatre etiquettes	1.00
	EPA 5: INFECTION CONTROL	
	Competencies related to knowledge	
33	describe standard precautions for infection control	0.02
34	Describe disinfection and sterilization	0.04
	Competencies related to skills	
35	Demonstrate use of PPE	0.05
36	Demonstrate handling and disposal of sharps	1.00
37	Demonstrate handling and disposal of chemical waste	0.04
38	Demonstrate management of blood and bodily fluids	0.07
	Competencies related to attitude	
39	Emphasize the importance of observing standard precautions	0.20
40	Ensure that students maintain infection control practices	0.10
	EPA 6: BASIC SUTURING SKILLS	
	Competencies related to knowledge	
41	Define suture and suture materials	1.00
42	Describe goals of suturing(wound edge apposition ,maintain hemostasis)	1.00
43	Selection of suture materials according to characteristics	0.02
	Competencies related to skills	
44	Demonstration of holding a needle holder	Cannot be computed because 2 data sets are exactly the same
45	Demonstrate placement of suture while observing the principles of suturing	Cannot be computed because 2 data sets are exactly the same
46	Demonstrate suturing techniques(interrupted, figure 8)	0.05
47	Demonstrate surgical knot tying	1.00
48	Demonstrate removal of sutures	0.02
	Competencies related to attitude	
49	Practice basic suturing principles (the knot should not be placed over the incision line, sutures should be placed 3-4 mm apart)	0.04
	EPA 7: WOUND MANAGEMENT	
	Competencies related to knowledge	
50	Describe the process of wound healing	1.00
51	Classify the factors affecting wound healing	0.05
	Competencies related to skills	
52	Demonstrate the closure and cleaning of wounds	0.07
53	Demonstrate wound toilet	0.20
54	Demonstrate wound debridement	1.00

	Competencies related to attitude	
55	Counseling of patient regarding systemic parameters	1.00
56	Educate patient about aftercare of wound	0.7

Dicussion

This study, which made use of the modified Delphi technique, proved a useful engagement of clinical teachers to establish desired EPAs for clinical teachers (who teach surgery/surgical skills at undergraduate level), their competencies, and assessment strategies along with supervision levels.[5-9] These EPAs constitute the essential range of activities for surgical teaching skills of clinical teachers, who teach surgery at the undergraduate level.

This study may prove to be a useful addition to the literature by defining specific tasks as E*ntrustable activities.* To our knowledge through the search, the study is first of its kind to employ EPA approach for outlining competencies in addition to assessment tools specifically for clinical teachers who teach surgical skills to undergraduates thus creating an entrustment framework for clinical teachers. Competencies have been defined as "a combination of attributes such as knowledge, skills and attitudes which enable an individual to perform a set of tasks to an appropriate standard".[10-13] They offer a shared language for defining what is required of the profession and contribute to consolidating the discipline (teacher competencies)

The EPAs which are meant for the assessment of teachers are very important for an integrative, all-inclusive competency-based assessment framework for patient-centered care in long run. That is mainly because clinical teachers play a very important role in the effectiveness of clinical education by providing knowledge to resolve problems in health care and skills needed for patient care.[14] They are meant to improve the quality of clinical teaching of surgical skills by standardizing them as a decision of entrustment. Each of the EPAs developed by expert consensus is a separate, discrete, observable and measurable task. Thus, it fits the description of an EPA as defined by ten. Entrustment for these EPAs requires proficiency in several competencies (knowledge, skill and attitudes) which can be assessed by several workplace-based assessment tools including OSATS and STSA[15].

A systematic review has been published in 2019 that shows that most studies followed more than one method of developing EPAs Very few EPA development studies aimed to develop their desired curriculum objectives along with EPA elaboration. Among these studies also, the formulation of the EPA-based curriculum has been done differently. For instance, A study describing the development of EPAs in the Canadian family medicine residency program identified relevant EPAs and their relevant curriculum domains along with templates that described competence at different levels of supervision.[16] In another article, authors tried to integrate EPAs with competencies and milestones through a mapping process in a continuum from un graduate to graduate medical education and generic to specialty EPAs. In the development of Anesthesiology EPAs in the Netherlands, the approach of the authors was to try and transform an existing curriculum to an EPA based format.[17] Conversely, in all these articles,

EPA-based curricula have been developed for specialties that already had some form of existing curricula present. However, work is yet to be done on the assessment of teachers especially those who teach surgical skills to undergraduates. This study can be a new addition because it identifies the EPAs for surgical teaching skills of surgical teachers by identifying related competencies for each EPA. In essence, this study is inspired and similar to work done by Dr. Ayesha Younas and colleagues who developed EPAs on patient-physician communication.[18] Also, Nayyar and colleagues defined a competency-based framework for undergraduate radiology clerkships by using an EPA approach.[19]

Conclusion

This study has resulted in the development of 7 EPAs with 46 competencies all aiming at supervision "Level 5" for teachers along with various assessment strategies. The EPA training and assessment of clinical teachers gives it a valuable position as an approach of interest where the primary goal of optimal patient care remains an ultimate priority. Every day patients put their trust in the healthcare system but as a community, we do not have enough proof that our faculty is competent to fulfill this responsibility. When clinical teachers teach undergraduates without any training or assessment, they are not competent to teach or assess the students. Members of the faculty enjoy the vital position as a teacher as well as mentor in the clinical settings and they should be assessed with reference to their baseline competence in applicable teaching EPAs. Upon achieving the desired competence, an entrustment decision can be made. Once proficient or expert, a "statement of awarded responsibility" (STAR) may be granted.

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