Importance of context in entrustable professional activities on surgical undergraduate medical education

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Abstract

Objective: The aim of this study was to emphasize the importance of integrating the context to the construction of the specific Entrustable Professional Activities (EPA) for Undergraduate Medical Education (UME). Design: Mixed study with three phases: 1) Exploratory, we searched context with focus groups technique. 2) Construction, we analyzed academic program of our faculty and the national epidemiology. Therefore, we selected the contents and generated each EPA with its milestones and competence levels. 3) Implementation, we conformed a formative assessment tool which was tested at surgery rotation. Setting: We worked with 10 public and private health institutions of secondary and tertiary health care levels which were used as clinical settings for surgery rotation of fifth year medicine course at the Faculty of Medicine of Universidad Nacional Autónoma de México in Mexico City. Participants: In exploratory focus groups, were involved 10 surgeons and 12 medical students. At implementation 64 students participated and 25 gave feedback. All participants were involved voluntary for this study. Results: We constructed eleven surgery specific EPAs for UME, within specific context of the clinical environment of our faculty. Conclusions: We propose these EPAs because they reflected the most important topics or diseases in our country and as educative developers we support the idea that our graduates should be able to attend the population needs of health.

Keywords: Entrustable professional activities, Hospital Surgery Department, undergraduate medical education, educational assessment, clinical competence
Introduction

The competency based education is a global trend for medical education and other disciplines, the Accreditation Council for Graduate Medical Education (ACGME) in the Outcome Project (Swing, 2007) identified six domains of general competencies for the medical education. Years later ACGME developed the "Milestone Project" (Nasca, Philibert, Brigham, & Flynn, 2012) for the postgraduate medical programs, these milestones contain behavioral descriptors for the competencies of each specialty or subspecialty. A milestone is "a point along a continuum of a competency or subcompetency: milestones are clearly described and are usually specialty specific" (Klink, Holmboe, & Carraccio, 2015). Later the concept of Entrustable Professional Activities (EPA) was described by Ten Cate (O. Ten Cate, 2005), to integrate the competencies by linking them with a specific clinical event, and allow their assessment.

The tendency of developing EPAs for medical students, at the beginning was exclusive for residents of different specialties, but also it is useful and could be applied for Undergraduate Medical Education (UME). Chen et al (Chen, van den Broek, & ten Cate, 2015), proposed three types of EPA for UME; core basic EPAs, core specialty-specific EPAs and individual elective EPAs. Ten Cate explained EPAs are "units of professional practice, defined as tasks or responsibilities to be entrusted to the unsupervised execution" (O. Ten Cate, 2005). For UME, we cannot expect the full entrustment for unsupervised activities. Therefore, we reviewed the Dreyfus model of skill acquisition (Dreyfus & Dreyfus, 1980), we identified that students can reach the "competent" performance level when they achieve the MD degree. The EPAs' use in UME serves to: encourage the students to achieve certain performance level in the clinical competences, increase their motivation, promote an objective assessment at the workplace.

Thus, we consider the opportunity to develop EPAs for early years of medical training to support the continuum of medical education. In a previous study Hamui et al propose the methodology for the development of core specialty-specific EPA (Hamui-Sutton et al., 2017), in this article we describe the General Surgery (GS) specific EPAs at UME. To develop a EPA the context is important, Ten Cate specifies EPAs' attributes, one of them is "are part of essential professional work in given context" (O. Ten Cate, 2005). The context has many variables: health care system, institutional culture, clinical settings, operative program, academic program, educational organization, hidden curriculum, epidemiology, among others. We contextualized the general surgery specific EPAs for UME in Mexican context. The aim of this study focus on context relevance and its variables for constructing EPAs and the use of analyzing the context to adoption of EPAs by other institution or country for UME.

Methods

A mixed method study was performed with three phases: 1) Exploratory, 2) Construction, 3) Implementation, with different settings, we will describe each one in the next paragraphs.

Exploratory

This was a qualitative phase, in individual sessions were four focus groups performed with medical students (12) and professors (10), the sessions were audio-recorded and literally transcribed to categorize and classified the testimonies with a priori construct, using grounded theory.

Construction
The triangulation of the information was the next step to construct the EPA we use the next documents: analysis of the previous focus groups, academic program for the fifth-year, hospital’s program of surgical clerkship (operative program) and the university program (Facultad de Medicina, 2009), ACGME core competencies and surgery milestones, our national epidemiological profile, and the Dreyfus (Dreyfus, 2004) first three levels. The work team were integrated by three medical education experts, one surgeon and two medical students, who initially developed five EPA. For the validation of content, we used a modified Delphi technique (Varela-Ruiz, Díaz-Bravo, & García-Durán, 2012) with six surgeons of five different hospitals and the comments generated made the team members reconstruct the five EPA to eight.

Implementation

For the implementation, we used a printed version of the eight EPA for students in 10 hospitals and for two months we visit each week in the surgery rotation, for any doubts and for data collect. In the final week, we gather all the printed EPA and perform a qualitative and quantitate assessment of the quality of the content and the usability in their hospitals with the professors and students. Once with all the data analyzed we reconstructed the EPA and finally ended with 11 for the surgery rotation.

Contextual variables in addition to those mentioned above were used in each phase such as the clinical settings for surgical clerkship: Consulting Room (CR), Emergency Room (ER), Hospitalization (H) and Operating Room (OR), the competence of the ACGME that is developed during the realization of the EPA this data set is shown in the appendix.

This work is registered with number 033-2013 before the Ethics and Investigation Committee of the UNAM Medicine School. Consent was obtained from participants. This work has been developed in 2016 and the delay of publication is because the lack of time.

Results

For all the construction of the eleven EPA-specific, we consider the Bloom taxonomy, the Dreyfus model, the national Guideline for clinical practice. The table 1 shows an example, of one EPA.

| Provide care to the patient with lower limb vascular disease. |
|-------------------------------------------------------------|
| Level 1 | Level 2 | Level 3 |
| Identify through the interrogation of symptoms and predisposing factors, perform incorrectly the exploration of lower limbs, include some maneuvers and specific signs. Suggest the request for paraclinical studies, initial management incompletely and some preventive measures according to presumptive diagnosis. Look for the most frequent complications, without identifying them and recognize some indications of surgical treatment. Makes the referral to the patient for specialized care without considering the criteria established in the current normative framework. | Identify symptoms and predisposing factors thorough focused history taking. Perform the general exploration of lower limbs, include maneuvers and identify specific signs according to diagnostic suspicion. Request and interpret paraclinical studies, indicate the initial management and promote preventive measures according to presumptive diagnosis. Identify the complications of the patient and recognize the indications for surgical treatment. Refer the patient in a timely manner to the patient for specialized management according to the criteria established in the current regulatory framework. |

**Discussion**

Many authors (Aylward, Nixon, & Gladding, 2014; Carraccio & Burke, 2010; Chen, van den Broek, et al., 2015; Hauer et al., 2015; O. T. J. ten Cate, 2013) consider the context for milestones EPA and practice competencies is important but do not describe the variables for analysing the context, we propose these variables to consider: faculty academic program topics, clinical settings, focus groups and the epidemiology of the diseases. The interactions of these variables are context indicators that function for the students in the real clinical setting.

The faculty academic program is a referral to construct the EPA because it establishes a relation between the knowledge and the real practice. Several authors (Brown Jr. et al., 2016; Chen, McNamara, et al., 2015; Deitte et al., 2016; El-Haddad, Damodaran, McNeil, & Hu, 2016; Hauer et al., 2013; Myers et al., 2015; Shumway et al., 2015) use this source to support the construct validation.

Considering the place where EPA can be developed and assessed the milestones could be a guide for the student and the clinical professor because this could determinate the type of patient or disease and the level of competence that could be achieved in a specific environment. If we suggest the clinical settings to evaluate the EPA this can contribute to increase the number of assessments and feedbacks.

The use of the focus groups works to know the reality in which the students and the clinical professors are placed and thus to realize a construction of EPA more attached to the possible reality. Chen et al used this first phase to know the relevance and adequacy of the levels of competence appropriate to the context in which students develop (Chen, McNamara, et al., 2015).

Epidemiology is an aspect that can be considered to know the relevance of diseases that are considered in each EPA it becomes relevant if you want to adopt or appropriate in other places where morbidity and mortality are different.

The interaction of these contextual variables for the application in real clinical situations allows to adapt the EPA to achieve a level of competence suitable for the students considering all variables making possible for their daily use.

We raise these variables in a specific context, however they are only some of which can be considered when
developing EPA so cautions should have been taken when moving them to other places. There are several reported types of methodology for the development of EPA. The methodology used here is reported in another study in detail by one of the authors Hamui (Hamui-Sutton et al., 2017).

**Conclusions**

This specific - EPA for UME in surgery service could be applied in other contexts, for medical students at the same grade, but considering the faculty academic program topics, clinical settings, focus groups and the epidemiology of the diseases of the place where it could be used.

**Take Home Messages**

**Notes On Contributors**

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Appendices

Appendix: Data used for triangulate and construction of the Entrustable Professional Activities

| GS-EPA | Academic program topics | Clinical settings | Focus group | ACGME competency | Epidemiology (ICD 10-number of cases in Mexico) |
|--------|-------------------------|--------------------|-------------|------------------|-----------------------------------------------|
| GS1. Provide care to the patient with surgical wound. | Management of surgical wounds | CR | "In the hospital, in the outpatient area, we followed patients who had surgery for revision of their wounds, removal of stitches, we also performed cures of diabetic foot", Student | PC, MK, ICS, PBLI | L90.5 - Scar conditions and fibrosis of skin (1,111) L91.0 - Hypertrophic scar (2,261) T81.3 - Disruption of operation wound (5,500) T81.4 - Infection following a procedure (7,782) |
GS2. Assess the need for surgical management in patients with gastroesophageal disease.

| Gastric diseases | Gastroesophageal reflux disease | Hiatal hernia | CR, ER H |
|------------------|---------------------------------|--------------|----------|
| "I would expect the inmate in the outpatient clinic, is to perform diagnoses of pathologies that are surgical, so that in their social service they can refer and can have the correct impression. Diagnostic criteria for reflux disease, initial management for peptic acid disease and reflux, and knowing when to refer to specialized consultation", *Professor* |

K20 – Oesophagitis (1,495)
K21 - Gastro-oesophageal reflux disease (6,970)
K22 - Other diseases of oesophagus (3,154)
K25 - Gastric ulcer (3,303)
K26 - Duodenal ulcer (965)
K27 - Peptic ulcer, site unspecified (878)
K29 - Gastritis and duodenitis (11,309)
K44 - Diaphragmatic hernia (hiatus) (4,687)
C15 - Malignant neoplasm of esophagus (1,671)
C16 - Malignant neoplasm of stomach (6,123)

GS3. Assess the need for surgical management in patients with pancreatic or biliary tract disease.

| Diseases of the bile duct | Pancreatitis | CR, ER H |
|---------------------------|--------------|----------|
| "The outpatient hospital, we had many patients, we saw the frequent pathologies, gallbladder, hernias, the doctors let us explore, practically everything, and in the end the doctor supervised us", *Student* |

K80 – Cholelithiasis (140,122)
K81 – Cholecystitis (70,452)
K83.0 - Cholangitis (1,574)
K83.1 - Obstruction of bile duct (jaundice) (1,108)
C23 - Malignant neoplasm of gallbladder (1,016)
C24 - Malignant neoplasm of other and unspecified parts of biliary tract (908)
K85 - Acute pancreatitis (22,145)
K86.0 y K86.1 - Chronic pancreatitis (1,010)
| GS4. Assess the need for surgical management in patients with intestinal disease. | Appendicitis Intestinal occlusion | CR, ER H | "Emergency inmates, talk to surgery to tell you we have an acute abdomen then you went and reviewed it alone. Then you would go and tell the surgeon and check the patient and say I think if you need surgery and then go and check it again and he decided", Student | PC, MK, ICS, PBLI | K25 - Acute appendicitis (82,109) K56 - Paralytic ileus and intestinal obstruction without hernia (19,991) K91.3 - Postoperative intestinal obstruction (172) |
| GS5. Assess the need for surgical management in patients with abdominal wall hernia. | Abdominal wall hernias | CR, ER H | "They should learn to read an ultrasound, make a touch of the abdominal wall looking for how the abdominal wall is or how the abdominal wall is normal and if you have a pathology as that pathology is detected. They will be the first contact either at the private or institutional level", Professor | PC, MK, ICS, PBLI | K40 - Inguinal hernia (82,109) K41 - Femoral hernia (1,440) K42 - Umbilical hernia (43,676) K43.0, K43.1 y K43.2 - Incisional hernia (2,037) K43.6 - Ventral hernia (Epigastric) (186) K43.9 – Eventration (15,388) |
| GS6. Provide care to the patient with diabetic foot. | Diabetic foot | CR, ER H | "In the morning during the rotation of surgery you do the tasks, get the laboratories go ask for imaging studies, informed consent, probes, diabetic foot cures ...", Student | PC, MK, ICS, PBLI | E10.4, E11.4, E12.4, E13.4, E14.4 - Diabetes mellitus with neurological complications (neuropathy) (1,375) E10.5, E11.5, E12.5, E13.5, E14.5 - Diabetes mellitus with peripheral circulatory complications (angiopathy) (41,858) |
| GS7. Provide care to the patient with lower limb vascular disease. | Lower limb vascular disease | CR | "In angiology, we see diabetic foot, peripheral vascular disease, venous insufficiency", *Student* | PC, MK, ICS, PBLI | I73.9 - Peripheral vascular disease, unspecified (1,219)  
I74.3 - Embolism and thrombosis of arteries of lower extremities (391)  
I80 - Phlebitis and thrombophlebitis (4,053)  
I83 - Varicose veins of lower extremities (4,369) |
| GS8. Provide care to the patient with thyroid disease. | Surgical thyroid disease | CR H | "We don't see a lot of patients with thyroid diseases, we only see them in the consulting room and for a checkup" *Student* | PC, MK, ICS, PBLI | E04.1 - Nontoxic single thyroid nodule (3,255)  
E04.2 - Nontoxic multinodular goiter (1,311)  
C73 - Malignant neoplasm of thyroid gland (4,865) |
| GS9. Provide care to the patient with colonic or anorectal disease. | Anorectal disease  
Colonic disease | CR, ER H | No data | PC, MK, ICS, PBLI | K57 - Diverticular disease of intestine (5,391)  
D12.6 - Colon, unspecified (Polyposis) (290)  
C18 - Malignant neoplasm of colon (9,342)  
K60 - Fissure and fistula of anal and rectal regions (8,888)  
K61 - Abscess of anal and rectal regions (5,838)  
K64 - Haemorrhoids and perianal venous thrombosis (7,920) |
| GS10. Provide care to the patient with urologic disease. | Urological diseases | CR, ER H | No data | PC, MK, ICS, PBLI | D29.1 - Benign neoplasm: Prostate (126)  
C61 - Malignant neoplasm of prostate (7,533)  
N40 - Hyperplasia of prostate (24,137) |
GS11. Participate in patient care in the surgical area.

Hydroelectrolytic and acid-base disorders in the surgical patient

OR

When they start, it is always under supervision, when they are advanced sometimes they can do things by themselves. What we have noticed, in our hospital, are always first assistant during the surgery... ”, *Professor*

SBP, P and ICS

| ICD Code | Description                                                                 | Frequency |
|---------|-----------------------------------------------------------------------------|-----------|
| E83.5   | Hypocalcemia                                                                | (740)     |
| E86     | Volumen depletion                                                           | (6,101)   |
| E87.0   | Hyponatremia                                                                | (1,063)   |
| E87.1   | Hyponatremia                                                                | (1,499)   |
| E87.2   | Acidosis                                                                    | (5,774)   |
| E87.3   | Alkalosis                                                                   | (41)      |
| E87.4   | Mixed disorder of acid-base balance                                        | (120)     |
| E87.5   | Hyperkalemia                                                                | (550)     |
| E87.6   | Hypokalemia                                                                 | (644)     |
| E87.7   | Fluid overload                                                               | (130)     |
| E87.8   | Electrolyte imbalance, Hypochloremia and Hyperchloremia                      | (4,929)   |

Notes: GS: General surgery, EPA: Entrustable Professional Activity, CR: Consulting Room, ER: Emergency Room, H: Hospitalization, OR: Operating Room, PC: patient care, MK: medical knowledge, PBLI: practice-based learning and improvement, ICS: interpersonal and communication skills, P: professionalism and SBP: systems-based practice. ICD: International Statistical Classification of Diseases and Related Health Problems

Declaration of Interest

*The author has declared that there are no conflicts of interest.*