Research Article

Challenges, Reliability, and Implementation Frameworks of Entrustable Professional Activities in Postgraduate Surgical Training: A Scoping Review

Jeff Walter Rajadurai OR[1], P. S. Manoharan[2], P Shanmuga Sundaram[3], Deepak Nallaswamy[4]

1-PhD in Health Professions Education, Saveetha Institute of Medical and Technical Sciences, Saveetha university, Chennai, India and Associate Professor, Department of Orthopaedics, Madha Medical College & Research Institute, Chennai, India, jeffy.walter@gmail.com
2-Professor, Department of Prosthodontics and Crown & Bridge, Associate Dean Academics, Saveetha Dental College, Programme Director, Health Professions Education, Saveetha Institute of Medical and Technical Sciences, Chennai, India,
manodent_2000@yahoo.com – Corresponding Author
3- Department of Orthopaedics, Madha Medical College and Research Institute, Chennai, Tamil Nadu, India, shanmumithra@gmail.com
4- Professor in Prosthodontics and Pro Chancellor, Saveetha Institute of Medical and Technical Sciences, Saveetha University, Chennai, India, dr.nallu@gmail.com

Abstract

Background: Entrustable Professional Activities (EPAs) have become part and parcel of competency-based medical education, used to provide a structured framework to assess a resident's readiness to practice independently. Their application to postgraduate surgical education has grown but findings regarding their implementation, assessment, reliability and educational impact are still varied. Objective: To review, visualize and integrate the existing literature regarding implementation, evaluation, reliability and development of EPAs in postgraduate surgical education. Methods: A scoping review was carried out following Preferred Reporting Items for Systematic Reviews and Meta-Analyses Extension for Scoping Reviews (PRISMA-ScR) guidelines. PubMed, Scopus, Web of Science, ScienceDirect and Cochrane Library databases were searched electronically. Eligibility criteria were pre-established and then studies were screened. Thematic descriptive synthesis was used for data synthesis, while a full-text article was coded using the Taguette qualitative analysis software. Results: Twenty studies were included in the eligibility criteria. Five themes emerged: implementation models, approaches to entrustment decision making, approaches to reliability and validity evidence, barriers and facilitators to implementation, and framework development and future directions. EPAs were frequently incorporated into workplace assessment systems and facilitated the gradual increase of resident independence. Assessor variations, documentation requirements, inconsistencies in entrustment and limited standardization were reported issues. Key factors for successful implementation were faculty development, institutional support, and integration in competency-based curricula. Conclusion: EPAs are a promising tool to assess competency in postgraduate surgical education. Multiple centers and follow-up studies are required to standardize implementation, establish assessment reliability, and validate long-term educational outcomes in a variety of surgical training environments.

Keywords: Competency Based Medical Education ; Entrustable Professional Activities ; Postgraduate Surgical Education; Surgical Residency Training; Workplace-Based Assessment.

1. Introduction

Competency based medical education (CBME) has transformed the concept of postgraduate medical education by devoting its focus away from clocking the time in the system rather than assessing the clinical competencies and competency evidence of the doctors in real life working environments. This shift has also had an impact on assessment, with greater focus on methods that are clinically relevant and assess readiness for professional practice, rather than the mere attainment of knowledge and skills. However, the traditional ways of assessing surgical education have been criticized for its failure to fully represent the complexity of operative decision making, professional judgment and readiness to unsupervised practice [1,2].

Ten Cate introduced "Entrustable Professional Activities" (EPAs) that are designed to link competencies to everyday clinical work by breaking competencies down into specific, observable, and measurable activities that can be evaluated [3]. An EPA is a separate area of professional practice that a learner is competent to do on the basis ofs achieving a proven level of competence. The role of entrustment has been a pivotal concept in postgraduate medical education since its inception and is a direct connection between assessment and the clinical responsibilities, and level of supervision that must be received by the student in practice [3,4].

EPAs in postgraduate surgical training have followed the trend of increasing demand for assessment systems that are structured and well anchored in clinical practice. The technical skill, clinical thinking, communication, professionalism, and intraoperative decision-making are all required for surgical training. Evaluating these interdependent skills goes beyond traditional evaluation methods. EPA-based assessment models have, therefore, been implemented in a variety

of surgical specialties to enhance trainee assessment, to facilitate progression towards competency and to foster meaningful feedback during residency [5–8]. Reflecting this direction, many institutions and national surgical organizations have begun incorporating EPA frameworks into residency training, including pilot initiatives in general surgery and specialty-specific adaptations [6,9,10].

While there has been increased interest in EPAs in surgical education, there remain a number of challenges that have prevented their more widespread adoption. Conflicting faculty engagement, entrustment decisions, and administrative burden, and lack of uniformity in assessment processes have been reported as barriers [5,6,11]. There have also been questions regarding the reliability and validity of EPA-based assessment, including the subjectivity of the assessor, variations in hands-on supervision approaches and inter-institutional differences in training quality [7,12,13]. The successful integration of EPAs into PGST thus goes beyond simply adding them to the PGST curriculum. It also relies on effective implementation strategies, comprehensive faculty development, and assessment frameworks that enable the consistent and defensible decision on entrustment.

In recent years, there has been a focus on the importance of finding better evidence of effectiveness and long-term sustainability of assessment using the EPA in surgical education. Implementation strategies, resident perceptions, and sources of validity evidence have been investigated in individual studies, but are not consistent across these studies, in terms of study design, surgical specialty, or assessment methods [5,7,9,12]. Meanwhile, EPA models, or frameworks to support EPA implementation, are still being developed and refined, including the additional development of entrustment scales, assessment tools, and longitudinal competency assessment models [10,14].

Given that the use of EPAs has been growing in postgraduate surgical education, and the wider move towards competency-based assessment, there is a need for a detailed synthesis of the evidence available. Scoping reviews are appropriate for mapping wide and dynamic research fields, pinpointing knowledge gaps, and synthesizing evidence from a variety of study designs [15,16]. There is no systematic review which integrates and summarises the evidence related to the implementation, reliability, problems and supporting frameworks for postgraduate surgical training EPAs to date. Hence, the objective of this scoping review was to outline the available literature on EPAs in postgraduate surgical education, specifically the methods in which EPAs are implemented, the reliability of assessing EPAs, and the development of the EPAs. It also aimed to identify the prime barriers, facilitators and gaps in evidence with regard to the integration of EPAs into surgical residency training.

2. Methods

2.1 Study Design

This scoping review explored evidence regarding the difficulties involved in conducting EPAs, their reliability and their frameworks during postgraduate surgical training. The overall framework came from the guidelines suggested by Arksey and O'Malley and other methodological guidelines for conducting evidence synthesis in health professions education [15,16]. The review is reported using the Preferred Reporting Items for Systematic Reviews and Meta-Analyses Extension for Scoping Reviews (PRISMA-ScR) guidelines [16].

As the research on EPAs in surgical training has a wide cross section of study designs, educational environments, assessment methods, and implementation techniques, a scoping review was deemed to be appropriate. The purpose of the review was to summarise the extent and nature of the evidence, identify trends in the research methodology and the education that it was on, and point to any gaps in the reliability of EPA implementation and/or its assessment in postgraduate surgical training.

2.2 Eligibility Criteria

Studies were eligible if they examined EPAs in postgraduate surgical education or surgical residency training. Included publications comprised original research, mixed-methods studies, qualitative studies, educational evaluations, implementation studies, validation studies, Delphi studies, and relevant scoping or narrative reviews focused on the assessment or implementation of EPAs in surgical education.

Eligible studies involved postgraduate surgical residents or fellows, surgical educators or assessors, competency-based surgical training programs, or EPA-based workplace assessment frameworks. Studies conducted exclusively in undergraduate medical education or non-surgical specialties without direct relevance to surgical training were excluded. Editorials, commentaries, conference abstracts lacking sufficient methodological detail, and non-English publications were also excluded.

2.3 Information Sources and Search Strategy

Structured search literature was carried out to find studies on EPAs in post graduate training in surgery. The electronic search of PubMed, Scopus, Web of Science, ScienceDirect, and Cochrane Library was done. A search strategy was used

to identify both free text and controlled vocabulary terms associated with EPAs, postgraduate surgical education, competency-based assessment, implementation, reliability, and framework development. The search methods used were tailored to the indexing methods and the search capability of the individual databases to ensure the maximum retrieval of relevant studies. Boolean operators ("AND" and "OR") and phrase searching were used to refine the search. Reference lists of all included studies and of relevant review articles were also hand searched for additional articles that might be included but were not found in the database searches. The main search strategy was oriented towards this concept structure: (Entrustable Professional Activities OR EPA OR entrustment) AND (surgical training OR residency OR postgraduate OR "medical education") AND (reliability OR assessment OR implementation OR challenges OR framework) Search strategies specific to the various databases are summarized in Table 1.

Table 1. PubMed Search Strategy

Database	Search Strategy
PubMed	("Entrustable Professional Activities" OR EPA OR entrustment) AND ("surgical training" OR residency OR postgraduate OR "medical education") AND (reliability OR assessment OR implementation OR challenges OR framework)
Scopus	TITLE-ABS-KEY ("Entrustable Professional Activities" OR EPA OR entrustment) AND TITLE-ABS-KEY ("surgical training" OR residency OR postgraduate OR "medical education") AND TITLE-ABS-KEY (reliability OR assessment OR implementation OR challenges OR framework)
Web of Science	TS=("Entrustable Professional Activities" OR EPA OR entrustment) AND TS=("surgical training" OR residency OR postgraduate OR "medical education") AND TS=(reliability OR assessment OR implementation OR challenges OR framework)
ScienceDirect	("Entrustable Professional Activities" OR EPA OR entrustment) AND ("surgical training" OR residency OR postgraduate) AND (reliability OR assessment OR implementation OR challenges OR framework)
Cochrane Library	("Entrustable Professional Activities" OR EPA OR entrustment) in Title/Abstract/Keywords AND ("medical education" OR surgical training OR residency)

2.4 Study Selection and Screening Process

Organizing, screening and thematizing the data from all retrieved citations and full-text articles were performed using Taguette, a software program for qualitative data analysis, which is used for the organization of the study. Studies were screened in two stages after eliminating duplicate records. Titles and abstracts were first screened and then a full-text evaluation was performed according to our eligibility criteria. Studies that did not relate to postgraduate surgical training, EPAs, implementation frameworks, approaches to assessment, reliability, or entrustment processes were screened out. Documentation of reasons for exclusion at the full text stage was done to maintain methodological transparency and to adhere to the standards of the scoping review process.

2.5 Data Synthesis and Thematic Analysis

Collating and interpreting findings of the included studies were carried out by descriptive thematic synthesis. The results were analysed iteratively to look for any commonalities in concepts for EPA implementation, practice of assessment, entrustment decision making, reliability and validity, and the development of frameworks in post-graduate surgical education. Systematic analysis was carried out by arranging and categorizing full-text articles with Taguette software in qualitative analysis. The text segments relevant to the selected studies were coded descriptively and then clustered into higher-level thematic categories using commonalities in the text across the studies. The thematic categories were identified from the literature and related to the objectives of the review. Five overall domains were identified: (1) models of implementation in surgical training; (2) approaches to entrustment decision making and assessment; (3) reliability and validity evidence; (4) barriers and facilitators to implementation; and (5) developing a framework and moving forward. The thematic synthesis used to pull together the main findings in these domains is summarized in Table 2.

Table 2. Thematic Synthesis of Included Studies

Theme	Subtheme	Key Findings	Representative Studies
Implementation Models	Curriculum integration	EPAs were integrated through phased implementation strategies	Stahl et al [5]
Reliability	Assessor variability	Inter-rater variability remained a challenge	Wagner et al [7]
Barriers	Faculty engagement	Limited faculty engagement, assessment burden, and the need for ongoing assessor training were identified as important barriers to EPA implementation and sustainability.	Stahl et al. [5]; Montgomery et al [14].
Framework Development	Contextual adaptation	EPA frameworks required specialty-specific modification	Amare et al. [10]; Montgomery et al [14].

3. Results

3.1 Study Selection and screening

The selection and screening of studies for this report were based on the following criteria: A thorough literature search was conducted on PubMed, Scopus, Web of Science, Science Direct and Cochrane Library, which yielded 1872 documents regarding EPAs in postgraduate surgical training. 614 duplicate records were eliminated and 1,258 unique records were left for title and abstract screening. Of these, 1,068 failed to address EPAs, were not undertaken in a surgical training/residency context, or were not focused on implementation, assessment, reliability, challenges, or framework development. Full-text articles were reviewed in total of 190. Of these, 165 were excluded due to inappropriate study population, lack of relevance to the goals of the review, inappropriate study design, inadequacy of the EPA-related data, publication as conference abstracts or opinion articles, or duplicate publication. Twenty-five other studies were found that were eligible to be included in the final scoping review, according to the pre-defined eligibility criteria. Selection of studies was conducted in accordance with the predefined review protocol and in compliance with the guidelines of the Preferred Reporting Items for Systematic Reviews and Meta-Analyses Extension for Scoping Reviews (PRISMA-ScR). The entire screening and selection process is shown in the PRISMA flow diagram (Figure 1).

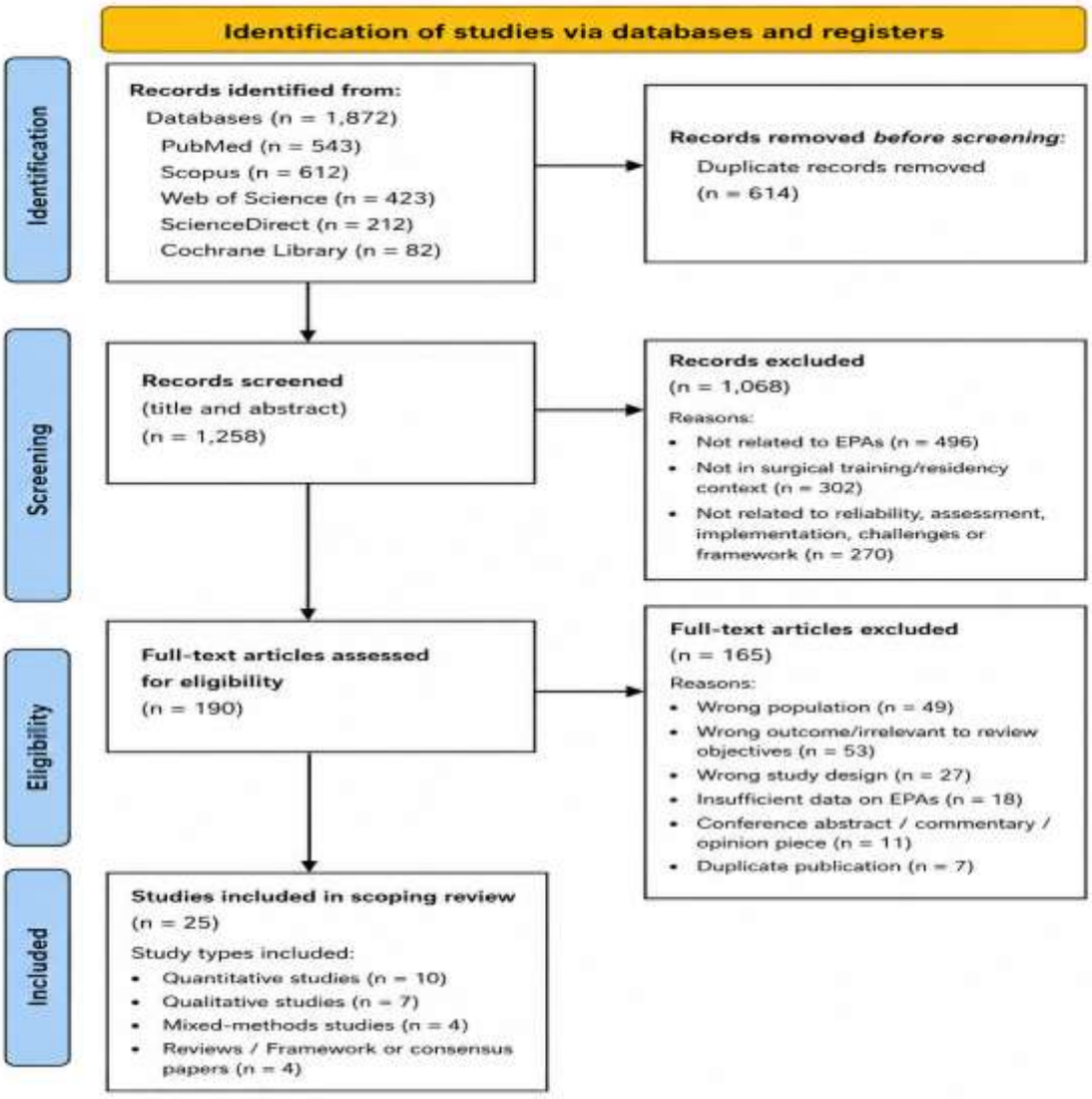


Figure 1. PRISMA Flow Diagram of Study Selection Process

3.2 Characteristics of Included Studies

Studies included spanned from 2018 to 2025, with the majority coming from the United States. Further support was provided by research undertaken in Ethiopia and elsewhere in the world on post-graduate surgical education. Most studies were done on general surgery residencies, but some studies concentrated on subspecialty surgical training and on surgical pathology education. There was methodological variety in the literature, including implementation studies, pilot studies, cross-sectional analyses, Delphi consensus studies, validity studies, narrative reviews, systematic reviews and scoping reviews. The largest number of studies were quantitative, followed by mixed methods and qualitative research. Other publications also covered the development of frameworks, the mapping of competencies and national efforts for integration of EPAs in training of surgeons. The studies in this package covered various aspects of EPAs in postgraduate surgical learning – implementation strategies, entrustment process, workplace-based assessment, EPA validation and reliability, faculty views and resident views, barriers and facilitators to implementation, and the creation of specialty-specific EPA frameworks. Overall, the evidence indicates increased interest in competency-based surgical education across the globe, and the increasing use of EPAs in assessment systems. The key features of the studies included are summarised in Table 3.

Table 3: Characteristics of the included studies

Author	Year	Country	Surgical Specialty / Context	Study Design	EPA Focus	Key Contribution
Murillo et al.	2025	USA	Surgical residency training	Observational educational study	Entrustment progression	Examined non-core EPA assessments and resident entrustment progression
Nel et al.	2025	International	General surgery	Scoping review	EPA implementation in surgery	Synthesized evidence relating to EPAs in postgraduate general surgery training
Gama et al.	2024	USA	Surgical pathology	Longitudinal educational study	Resident development	Explored longitudinal observations of resident progression using EPAs
Montgomery et al.	2025	USA	Surgical education	Narrative review	EPA implementation and assessment	Reviewed current EPA practices and assessment frameworks in surgery
Montgomery et al.	2024	USA	General surgery residency	Validation study	Validity of EPA assessment	Evaluated validity evidence for EPA use in national residency programs
Pakkasjärvi et al.	2024	International	Surgical training	Systematic review	Competency frameworks	Examined surgical competency and learning objective frameworks
Felicelli et al.	2023	USA	Surgical pathology residency	Implementation study	EPA integration	Reported implementation of EPAs within pathology residency education
Hackney et al.	2023	United Kingdom	General surgical training	Scoping review	Competency assessment	Reviewed assessment methods used in surgical trainee

						competency evaluation
Liebert et al.	2022	USA	General surgery	Validation study	Surgical decision-making assessment	Evaluated validity evidence for ENTRUST assessment tools
Amare et al.	2022	Ethiopia	General surgery residency	Delphi consensus study	EPA framework development	Developed a national EPA framework for surgical residency training
Pinilla et al.	2021	International	Clinical education	Scoping review	EPA implementation in clinical education	Synthesized evidence on EPA use across clinical education settings
Bramley and McKenna	2021	International	Health professions education	Scoping review	EPA implementation	Examined EPAs in entry-level health professions education
Kearse et al.	2021	USA	General surgery residency	Cross-sectional study	Preoperative entrustment	Investigated graduating residents' perceptions of entrustment readiness
Stahl et al.	2020	USA	General surgery residency	Educational implementation study	EPA curriculum integration	Described implementation of EPAs in surgical residency training
Stahl et al.	2020	USA	General surgery residency	Cross-sectional educational study	Resident self-assessment	Examined resident self-assessment trends using EPAs
Shorey et al.	2019	International	Healthcare education	Scoping review	EPA implementation	Synthesized evidence on EPAs in healthcare education
Meyer et al.	2019	USA	Undergraduate medical education	Scoping review	EPA frameworks	Reviewed EPA implementation in undergraduate medical education

Steiman et al.	2018	USA	Surgical residency training	Educational assessment study	Surgical competency assessment	Evaluated competency assessment using surgical EPAs
Wagner et al.	2018	USA	General surgery residency	Cross-sectional study	Entrustment-based assessment	Investigated EPA use in surgical resident competency assessment
Neto et al.	2018	Brazil	Surgery residency program	Educational implementation report	EPA-based assessment implementation	Described implementation of EPA-based assessment within surgical residency training

The major themes, subthemes, and synthesized findings identified across the included studies are summarized in Table 4.

Table 4: Themes,subthemes and findings of the included studies

Theme	Subtheme	Synthesized Findings	Representative Studies
Implementation of EPAs in Postgraduate Surgical Training	Curriculum integration	EPAs were commonly integrated into existing competency-based curricula through phased implementation strategies, curricular mapping, and incorporation into workplace-based assessment systems. Successful integration frequently required alignment with institutional training objectives and longitudinal assessment structures.	Stahl et al. [5]; Felicelli et al. [17]; Gama et al. [19]
	Faculty preparation and engagement	Faculty orientation, assessor training, and institutional support were repeatedly identified as essential for implementation success. Studies reported that inadequate faculty preparation contributed to inconsistent assessment practices and reduced adoption.	Stahl et al [5].
	Institutional adaptation	Implementation approaches varied across institutions depending on	Amare et al. [10]; Pinilla et al. [22]; Nel et al [20].

		educational culture, technological infrastructure, available resources, and prior experience with competency-based assessment systems.	
Entrustment Decision-Making and EPA-Based Assessment	Workplace-based assessment	EPAs were predominantly used within workplace-based assessment models to evaluate clinical performance, operative readiness, and progressive trainee autonomy in authentic surgical settings.	Wagner et al. [7]; Steiman et al. [8]; Montgomery et al. [14]; Kearse et al. [26]
	Entrustment scales and supervision levels	Several studies described the use of supervision-level scales and entrustment rating systems to support structured evaluation of resident progression toward independent practice.	Wagner et al. [7]; Liebert et al. [13]; Montgomery et al [14].
	Resident progression and autonomy	EPA-based assessment frameworks were frequently associated with longitudinal tracking of resident development and increasing clinical responsibility across training stages.	Murillo et al. [25]; Gama et al. [19]; Kearse et al. [26]; Stahl et al [5].
Reliability and Validity of EPA Assessments	Assessor variability	Inter-rater variability and differences in faculty interpretation of entrustment criteria were among the most frequently reported limitations affecting assessment consistency.	Wagner et al. [7]; Montgomery et al [14].
	Validity evidence	Multiple studies reported validity evidence supporting the educational relevance of EPA-based assessment, including associations between entrustment ratings and resident competency progression.	Liebert et al. [13]; Montgomery et al [14].
	Standardization challenges	Studies identified ongoing concerns regarding inconsistent assessment completion, contextual	Hackney et al. [29]; Nel et al. [20]

		influences on entrustment decisions, and the absence of universally standardized assessment frameworks.	
Barriers and Facilitators to EPA Implementation	Faculty workload and time burden	Increased documentation requirements, limited assessment time, and competing clinical responsibilities were commonly identified barriers to sustained EPA implementation.	Stahl et al. [5]
	Educational culture and acceptance	Institutional acceptance of competency-based education principles influenced implementation success. Programs with prior workplace-based assessment experience demonstrated greater readiness for EPA adoption.	Pinilla et al. [22]; Shorey et al. [21]; Stahl et al. [5]
	Facilitators of implementation	Structured faculty development initiatives, clear entrustment frameworks, digital assessment systems, and longitudinal feedback mechanisms were identified as important facilitators supporting implementation.	Montgomery et al. [14]; Felicelli et al. [17]; Gama et al. [19]
Framework Development and Future Directions	Specialty-specific framework development	Several studies described development of specialty-adapted EPA frameworks designed to reflect local training needs, procedural expectations, and competency requirements within surgical education.	Amare et al. [10]; Felicelli et al. [17]; Gama et al. [19]; Montgomery et al [14].
	Consensus-building approaches	Delphi methodologies and expert consensus approaches were frequently used to establish EPA domains, entrustment criteria, and competency expectations.	Amare et al. [10]
	Future research priorities	Future directions included improved assessor calibration, multi-institutional implementation studies,	Nel et al. [20]; Montgomery et al. [14]; Pakkasjärvi et al. [27]; Hackney et al. [29]

		longitudinal competency tracking, digital integration, and evaluation of long-term educational outcomes.	

Theme 1: Implementation of EPAs in Postgraduate Surgical Training

The implementation of EPAs in postgraduate surgical education was mostly reported in the context of the shift to competency based medical education and the incorporation of workplace-based assessment. The most frequently adopted implementation approaches were curricular mapping, faculty orientation, phased implementation, and integration of EPAs into current assessment systems for residencies [5,17–19].

By pairing EPAs with existing competencies in general surgery residencies and fitting them into a longitudinal assessment model, Stahl et al. incorporated EPAs into a general surgery residency program [5]. The same experiences in surgical pathology showed that the principles of EPA can be transferred to other assessment structures as appropriate to the specialty of surgery, which allows for use in other surgical fields [17,19].

Structured assessment systems, faculty engagement, educational culture, and institutional infrastructure were consistently important factors that affected successful implementation [20–22]. Other broad-scale reviews in health professions education also found that faculty time, assessment tools and resources, and contextual adaptation were important factors that influenced successful implementation [21–24]. Some studies also had pointed out that the use of EPAs should be done throughout the residency program and not as one-off assessments [18,19].

Theme 2: Entrustment Decision-Making and EPA-Based Assessment

Many of the studies included focused on epistemological analysis of EPA, and the processes of entrustment decision making in surgical training. The assessment of resident autonomy, operative readiness, clinical judgment and progression to independent practice was the most common use of EPAs [7,8,13,25].

In a study of 25 surgical residents, Wagner et al. showed that EPAs are useful and clinically relevant measures of surgical resident competence for a variety of surgical domains [7]. Steiman et al demonstrated that surgical EPAs are useful for competency assessment in a structured way and can be used to monitor the progression of residents over time [8]. Kearse et al. found that graduates' perceptions of their readiness for independent operative responsibility varied [26]. Murillo et al. also studied the contribution that non-core EPA assessments make to the understanding of entrustment progression as complexity of the assessment procedure increases [25].

There was some variation between institutions and surgical specialties in the methods used to assess. These methods were reported as entrustment scales, milestone-based assessment tools, simulation-based assessment tools, or workplace-based assessment [7,13,14]. Surgical pathology research also showed that entrustment frameworks can be adapted to non-operative settings where the assessment is diagnostic with a focus on the principles of EPA-based assessment [17,19].

EPA-based assessment received mostly positive response, but some studies noted differences in assessment frequency, in the way assessment scores at entrustment levels were interpreted, and in the way these scores were handled by faculty for assessment or evaluation. This is an ongoing issue that is still testing the effectiveness of standardized assessments in training programmes [20].

Theme 3: Reliability and Validity of EPA Assessments

The key issues that were investigated repeatedly in the studies included were reliability and validity. To determine whether postgraduate surgical competency was accurately measured by the EPA and had any educational value, several authors analyzed this [7,13,14].

Liebert et al. measured the validity of ENTRUST as an instrument to support surgical decision making in the framework of inguinal hernia as an educational tool [13]. Montgomery et al. also analyzed the validity of EPAs across a national sample of general surgery residency programs by comparing the ratings of EPAs with competency milestone assessments [14].

The evidence available was largely in favour of the validity of the assessment and reliability and consistency of the entrustment decisions remained prevalent. Assessor variability, inconsistent interpretation of the criteria for entrustment, and variations in assessment practices among faculty were among the common problems reported [20]. Supervision practices, faculty familiarity of individual trainees and operative complexity were also factors influencing the decisions on entrustment [14,25].

The results overall reflect the educational use of assessment in surgical training based on EPA. But, the literature also demonstrates the need for establishing common assessment procedures, further training of the assessors, and better calibration of the assessors, and more uniform entrustment processes to increase the reliability of EPA-based evaluation between institutions [14,20,27].

Theme 4: Barriers and Facilitators to EPA Implementation

This theme highlights barriers and facilitators to EPA implementation. All of the studies included in this review reported barriers to the implementation of EPA. Some of the common problems were: lack of faculty time and the need for more documentation, inconsistent participation of the assessors and lack of clarity in the interpretation and application of entrustment criteria [20].

Research in surgical pathology identified other practical considerations for implementation, such as having specialty-specific assessment forms and having an evaluation process that was streamlined and faculty was familiar with EPA-based evaluation methods [17,19].

There were some factors that helped implementation to be successful. They encompassed specific faculty development approaches, incorporation of EPAs into current assessment processes, institutional support, explicit entrustment structures, and longitudinal feedback processes [14,27]. There were also some broader comments in health professions education about the need to customise the framework for EPAs to meet local contexts, engage faculty, and link EPAs with real clinical learning experiences [21,22].

Familiarity with competency-based education practices seemed to foster the successful implementation of EPAs, as programs with some experience with competency-based assessment and workplace-based evaluation were more likely to be successful in doing so [5,22].

Theme 5: Framework Development and Future Directions

Two key areas of current research were identified as development of the framework, and contextual adaptation. A number of studies have been conducted on the creation or improvements of surgical specialty-specific and training setting-specific EPA frameworks that are specific to the educational needs of their surgical specialties and training environments [10,14,20].

A Delphi consensus process was used to develop a national EPA framework for surgical residency training in Ethiopia, emphasizing the need for stakeholder engagement and adaptation to the local context [10]. Montgomery et al. highlighted the changing landscape of EPAs in surgical education and the current work underway to enhance the process of entrustment, standardise assessment, and further develop the integration of competency-based assessment into surgical education programmes [14]. Similarly, Nel et al. compiled and analysed the international evidence on the implementation of EPA in postgraduate general surgery and found a significant variation in the number, structure, sequence and assessment of EPAs across educational settings [20].

The literature consistently identified a number of priorities for future research and implementation, such as more training of assessors, more uniform entrustment scales, incorporation of digital assessment tools, long-term assessment of the progression of competency, and aligning EPA frameworks with the broader surgical competency frameworks [14,20,28]. Other studies have also recommended multi-institutional studies to assess long-term educational impacts of EPA-based assessment across surgical specialties as well as implementation outcomes [25].

Overall, the included studies demonstrated a rising interest in the creation and use of EPA frameworks in post-graduate training in surgical specialties. They also point to current issues of implementation consistency and assessment reliability, contextualization, and standardization of the frameworks. The synthesis revealed five overarching thematic domains: implementation models in surgical training, models for making entrustment decisions and assessment, reliability and validity evidence, barriers and facilitators to implementation, and framework development with future directions. These domains and how they interrelate and contribute to the integration of EPAs into post-graduate surgical education are depicted in Figure 2.

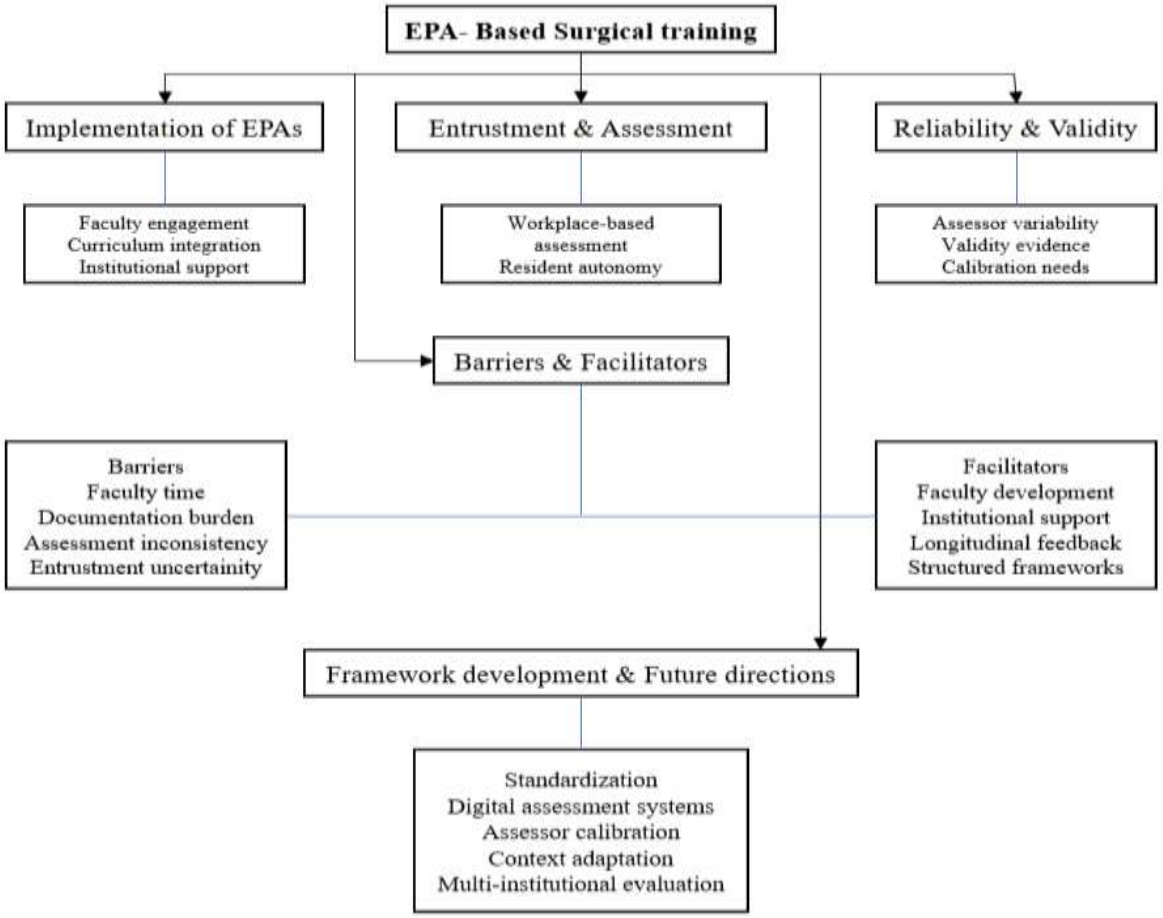


Figure 2. Thematic framework of Entrustable Professional Activities (EPAs) in postgraduate surgical education. The figure summarizes the five major thematic domains identified across the included studies and illustrates their interconnected roles in shaping EPA implementation, assessment practices, reliability considerations, implementation challenges, and future framework development within surgical training programs

4. Discussion

This scoping review aimed to review and summarise current literature regarding the difficulties, validity and implementation of EPAs in postgraduate surgical training. The results suggest that EPA-based assessment is gradually becoming more entrenched in surgical education, marking the trend towards competency-based medicine education and workplace-based assessment. In all of the studies reviewed, EPAs were employed in the evaluation of operative readiness, progressive autonomy, and clinical responsibility in real-world clinical contexts [7,14,18].

The implementation of EPAs was consistently described as heterogeneous, and dependent on the educational context. There have been several studies that have described staged implementation models, such as curricular mapping, piloting, faculty orientation, and embedding into existing faculty assessment procedures, instead of major curriculum redesign. The results indicate that to be effective, not only should an assessment system be adopted, but there also must be institutional readiness, faculty participation, and integration of EPAs in current training programs in a longitudinal approach [5].

Reliability and consistency of assessments were prominent themes in the literature reviewed. There were a few studies that offered validity evidence for the educational value of EPA-based assessment, but problems with assessor variability and the inconsistent interpretation of the criteria for entrustment were frequently reported [8,13]. Operative difficulty, faculty familiarity with individual trainees and variations of supervision were also factors in entrustment decisions. The results highlighted the need for continuous assessor calibration, faculty development, and standardization of entrustment framework to enhance the reliability of assessment using EPAs in different institutions [14].

Some barriers identified in this review that remain a challenge in the implementation of the EPA-based assessment in surgical education were also identified. Facing these challenges, some of the most noted issues were increased

documentation requirements, limited faculty time, inconsistent assessment completion, and uncertainty about the expectations for entrustment [5]. Other factors, however, were found to be linked to successful implementation as the support from institutions, faculty development, longitudinal feedback mechanisms and incorporation of EPAs in the existing educational structures were found to be consistently linked to more successful implementation [5,14]. Programs that had prior experience in competency-based assessment were also more likely to be ready to adopt and integrate EPAs, reflecting that prior experience in competency-based practice helps to make it easier to implement [5]. Another major recurring theme in all of the studies included was in the area of framework development. Several authors argued for tailoring the EPA formats for each specialty in surgery to the training priorities, expectations of procedures, and healthcare settings of that specialty [10,17]. Further, programs with proven knowledge of competency assessment frameworks seemed to be better equipped to implement and integrate EPAs, and prior knowledge of competency assessment practices may ease the transition to the use of EPAs [10]. Notwithstanding these developments, there was significant variation in assessment formats, entrustment levels, and strategies in each institution and surgical specialty [14].

The findings together indicate that EPAs have become more prominent in the process of competency assessment in postgraduate surgical education. But, implementation of standards, assessment reliability, multicentre evaluation and measurement of long-term educational outcomes are still not adequately standardized. Further studies are needed to develop a standard framework for entrusting, to examine strategies for assessing assessor calibration, and to conduct a longitudinal study in various surgical specialties to further support the incorporation of EPAs in surgical postgraduate training programmes [14,29].

In addition to the literature of surgical education, there is a growing literature around the transition to competency-based medical education (CBME) across the health professions, which further endorses the use of structured assessment frameworks like EPAs. Medical and dental education studies have emphasised the need for a clear definition of the competencies, faculty involvement, curriculum modification and a learner-centered approach in implementing competency-based training [30–32]. While these studies were not conducted specifically to explore EPAs in postgraduate surgical training, they provide education-related lessons that are in keeping with the objectives of competency-based surgical education, and highlight the need for further innovation in assessment and curriculum development.

Strengths and Limitations

This scoping review aims to offer a focused synthesis of the literature about the implementation and reliability of EPAs in postgraduate surgical training, as well as the assessment frameworks. The review was conducted in a systematic manner based on the PRISMA-ScR recommendations and the evidence was shared and mapped through different surgical training environments and study designs. The inclusion of research regarding implementation strategies, validity evidence, faculty perspectives and framework development provides a comprehensive overview of current competency-based surgical education. The conclusions should be viewed with some important caveats. First, the studies included were not uniformly designed and implemented, making direct comparisons difficult because of differences in the assessment tools and outcome measures. Second, most studies were done in North American training settings, and may not be transferable to other educational and healthcare systems. Third, due to its scoping review nature, a formal risk-of-bias assessment was not conducted since the goal was to map the available evidence instead of assessing interventions. Lastly, the implementation of EPA in surgical education is ongoing and assessment methods and institutional approaches will continue to evolve with the growing development of competency-based medical education and workplace-based assessment.

5. Conclusion

The move towards competency-based medical education has a context of EPAs being increasingly incorporated into postgraduate surgical training. The available evidence indicates that they offer a structure to workplace-based assessment, and the progressive development of trainee autonomy during residency. Although they are increasingly adopted, there are inconsistencies across institutions in implementation, and, as yet, issues of assessor consistency, faculty engagement and standardised assessment practices. This review suggests that the integration of EPAs is dependent upon continued faculty development, explicit entrustment frameworks and EPAs being integrated to existing educational structures. EPA-based assessment in surgical training now has some evidence for its educational value, but more multicenter, longitudinal studies are needed to enhance the reliability of assessment, standardize the frameworks, and assess long-term educational outcomes in a variety of surgical specialties.

References

1. Frank JR, Snell LS, Cate OT, Holmboe ES, Carraccio C, Swing SR, et al. Competency-based medical education: theory to practice. Med Teach. 2010 Aug;32(8):638–45. doi:10.3109/0142159X.2010.501190
2. Schumacher DJ, Englander R, Carraccio C. Developing the Master Learner: Applying Learning Theory to the Learner, the Teacher, and the Learning Environment. Acad Med. 2013 Nov;88(11):1635–45. doi:10.1097/ACM.0b013e3182a6e8f8
3. Ten Cate O. Entrustability of professional activities and competency-based training. Med Educ. 2005 Dec;39(12):1176–7. doi:10.1111/j.1365-2929.2005.02341.x
4. Ten Cate O, Chen HC, Hoff RG, Peters H, Bok H, Van Der Schaaf M. Curriculum development for the workplace using Entrustable Professional Activities (EPAs): AMEE Guide No. 99. Med Teach. 2015 Nov 2;37(11):983–1002. doi:10.3109/0142159X.2015.1060308
5. Stahl CC, Collins E, Jung SA, Rosser AA, Kraut AS, Schnapp BH, et al. Implementation of Entrustable Professional Activities into a General Surgery Residency. J Surg Educ. 2020 Jul;77(4):739–48. doi:10.1016/j.jsurg.2020.01.012
6. Brasel KJ, Lindeman B, Jones A, Sarosi GA, Minter R, Klingensmith ME, et al. Implementation of Entrustable Professional Activities in General Surgery: Results of a National Pilot Study. Ann Surg. 2023 Oct;278(4):578–86. doi:10.1097/SLA.0000000000005991
7. Wagner JP, Lewis CE, Tillou A, Agopian VG, Quach C, Donahue TR, et al. Use of Entrustable Professional Activities in the Assessment of Surgical Resident Competency. JAMA Surg. 2018 Apr 1;153(4):335. doi:10.1001/jamasurg.2017.4547
8. Steiman J, Sullivan SA, Scarborough J, Wilke L, Pugh C, Bell RH, et al. Measuring Competence in Surgical Training through Assessment of Surgical Entrustable Professional Activities. J Surg Educ. 2018 Nov;75(6):1452–62. doi:10.1016/j.jsurg.2018.05.004
9. Dent DL, Patnaik R, Atkinson A, Shomette JD, Mascitelli JR, Page-Ramsey SM, et al. Implementation of entrustable professional activities in multiple surgical residencies: A quality improvement approach. Am J Surg. 2023 Dec;226(6):868–72. doi:10.1016/j.amjsurg.2023.07.014
10. Amare EM, Siebeck M, Sendekie TY, Fischer MR, Berndt M. Development of an Entrustable Professional Activities (EPA) Framework to Inform Surgical Residency Training Programs in Ethiopia: A Three-round National Delphi Method Study. J Surg Educ. 2022 Jan;79(1):56–68. doi:10.1016/j.jsurg.2021.06.023
Williams-Karnesky RL, White E, Holmstrom A, Garcia N, Johnson J, Cook M, et al. Faculty and Resident Perspectives on the Implementation of Entrustable Professional Activities in General Surgery Residency. J Surg Educ. 2024 Jun;81(6):841–9. doi:10.1016/j.jsurg.2024.03.006
11. Brazelle M, Zmijewski P, McLeod C, Corey B, Porterfield JR, Lindeman B. Concurrent Validity Evidence for Entrustable Professional Activities in General Surgery Residents. J Am Coll Surg. 2022 May;234(5):938–46. doi:10.1097/XCS.0000000000000168
12. Liebert CA, Melcer EF, Keehl O, Eddington H, Trickey AW, Lee M, et al. Validity Evidence for ENTRUST as an Assessment of Surgical Decision-Making for the Inguinal Hernia Entrustable Professional Activity (EPA). J Surg Educ. 2022 Nov;79(6):e202–12. doi:10.1016/j.jsurg.2022.07.008
13. Montgomery KB, Mellinger JD, Lindeman B. Entrustable Professional Activities in Surgery: A Review. JAMA Surg. 2024 May 1;159(5):571. doi:10.1001/jamasurg.2023.8107
14. Arksey H, O'Malley L. Scoping studies: towards a methodological framework. Int J Soc Res Methodol. 2005 Feb;8(1):19–32. doi:10.1080/1364557032000119616
15. Tricco AC, Lillie E, Zarin W, O'Brien KK, Colquhoun H, Levac D, et al. PRISMA Extension for Scoping Reviews (PRISMA-ScR): Checklist and Explanation. Ann Intern Med. 2018 Oct 2;169(7):467–73. doi:10.7326/M18-0850
16. Felicelli C, Gama A, Chornenkyy Y, Choy B, Blanco LZ, Novo JE. From principles to practice: Implementation of entrustable professional activities (EPAs) for surgical pathology residency education in a large academic hospital. Acad Pathol. 2023 Oct;10(4):100097. doi:10.1016/j.acpath.2023.100097
17. Vilela Neto P, Anjos PSD, Loyola FAZ, Moura AS. Implementation of an assessment based on entrustable professional activities in a surgery medical residency program. Rev Eletrônica Acervo Saúde. 2025 Mar 18;25:e19290. doi:10.25248/reas.e19290.2025
18. 19. Gama A, Felicelli C, Agarwal I, Bronson T, Choy B, Escobar DJ, et al. Entrustable professional activities (EPAs) in surgical pathology: implementation experience and longitudinal observations of resident development. Acad Pathol. 2024 Oct;11(4):100150. doi:10.1016/j.acpath.2024.100150

19. Nel D, Jonas E, Burch V, Cairncross L, Nel A, Alseidi A, et al. Entrustable Professional Activities in Postgraduate General Surgery Training: A Scoping Review. Ann Surg. 2025 Jun;281(6):960–7. doi:10.1097/SLA.0000000000006400
20. Shorey S, Lau TC, Lau ST, Ang E. Entrustable professional activities in health care education: a scoping review. Med Educ. 2019 Aug;53(8):766–77. doi:10.1111/medu.13879
21. Pinilla S, Lenouvel E, Cantisani A, Klöppel S, Strik W, Huwendiek S, et al. Working with entrustable professional activities in clinical education in undergraduate medical education: a scoping review. BMC Med Educ. 2021 Dec;21(1):172. doi:10.1186/s12909-021-02608-9
22. Bramley AL, McKenna L. Entrustable professional activities in entry-level health professional education: A scoping review. Med Educ. 2021 Sep;55(9):1011–32. doi:10.1111/medu.14539
23. Meyer EG, Chen HC, Uijtdehaage S, Durning SJ, Maggio LA. Scoping Review of Entrustable Professional Activities in Undergraduate Medical Education. Acad Med. 2019 Jul;94(7):1040–9. doi:10.1097/ACM.0000000000002735
24. Murillo AD, Lee YL, Gomes C, Faktor K, Brian R, Cate OT, et al. Non-core entrustable professional activities (EPAs) assessments enhance understanding of resident entrustment progression. Glob Surg Educ - J Assoc Surg Educ. 2025 Aug 29;4(1):72. doi:10.1007/s44186-025-00380-8
25. Kearse LE, Schmiederer IS, Anderson TN, Dent DL, Payne DH, Korndorffer JR. American Board of Surgery Entrustable Professional Activities (EPAs): Assessing Graduating Residents' Perception of Preoperative Entrustment. J Surg Educ. 2021 Nov;78(6):e183–8. doi:10.1016/j.jsurg.2021.09.004
26. Pakkasjärvi N, Anttila H, Pyhältö K. What are the learning objectives in surgical training – a systematic literature review of the surgical competence framework. BMC Med Educ. 2024 Feb 6;24(1):119. doi:10.1186/s12909-024-05068-z
27. Sandhu G, Jones A, Barry CL, Buyske J, Mellinger JD, Lindeman B. Research Agenda for Entrustable Professional Activities Among US Surgical Specialties. Ann Surg. 2025 Jul;282(1):13–9. doi:10.1097/SLA.0000000000006623
28. Hackney L, O'Neill S, O'Donnell M, Spence R. A scoping review of assessment methods of competence of general surgical trainees. The Surgeon. 2023 Feb;21(1):60–9. doi:10.1016/j.surge.2022.01.009
29. Das R, Ramani P, Sukumaran G, Ramasubramanian A, Veeraiyan DN. Evaluating the effectiveness of problem-based learning combined with six thinking hats in oral pathology education. BMC Oral Health. 2025 Oct 3;25(1):1523. doi:10.1186/s12903-025-06554-6
30. Date VS, Lakhani SJ, Pandya HB, Bhalodia NM. Learnings and Reflections on Transition to New Competency-based Medical Education, MBBS curriculum in Microbiology: A Cross-sectional Observational Study. J Clin Diagn Res. 2024. doi:10.7860/JCDR/2024/68438.19481
31. A PA, S MP. Competency Based Education – Better late than never! J Clin Prosthodont Implantol. 2020 Dec 31;2(2):1–7. doi:10.55995/j-cpi.2020e2