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# Advances in the Application of Entrustable Professional Activities in Standardized Residency Training

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***Abstract:*** *Standardized residency training(SRT)constitutes a crucial component in developing clinically competent physicians. Current systems face challenges including unidimensional assessment methods and insufficient standardization of implementation protocols. Within the competency-based medical education (CBME) framework, entrustable professional activities (EPA) offer a novel approach by deconstructing clinical competencies into observable, assessable tasks.This study comprehensively reviews global applications of EPA and comparatively analyzes regional variations in framework development, implementation strategies, and evaluation systems. Internationally,EPA scholarship and clinical integration exhibit relative maturity,while domestic adoption remains nascent.Further exploration should prioritize three domains:(1) enhancing clinical decision-making through task-specific competency mapping;(2) aligning curricula with workplace demands;and (3) fostering competency progression frameworks.These findings offer theoretical and methodological insights for advancing China's SRT reform, proposing evidence-driven strategies to harmonize medical education quality and standardization.*

***Keywords:*** *Entrustable professional activities; Standardized training of general resident; Competency; Medical education*

## 1. Introduction

Standardized residency training serves as a pivotal mechanism for cultivating clinically competent physicians by enhancing professional literacy and clinical decision-making skills[1]. However, current systems face challenges including unidimensional assessments, inadequate implementation protocols, and insufficient supervision[2]. While competency-based medical education(CBME) standardizes competency deconstruction, its limitations include fragmented evaluation dimensions and cumbersome processes[3-5].In 2005, Professor Ten Cate Olle from the Netherlands proposed EPA, solving evaluation and training problems in clinical settings.EPA,as a new core competency model, assesses medical students' overall qualities through daily work, fitting for practical training and evaluation, better demonstrating their competencies,and gradually becoming a key measure of learners' competencies[6-9].

EPA research abroad mainly focuses on the US,Canada and Switzerland,covering undergraduate medical education EPA construction,clinical teaching applications, and combinations with milestone frameworks[9-10].China's EPA research started late, focusing on definitions,current situations,and applications[11]. This paper collects EPA literature, compares EPA frameworks in China and abroad, and aims to offer references for China's Standardized residency training.

## 2. Definition and Application Status of Entrustable Professional Activities

### *2.1. Definition*

Trust means being entrusted; professional behavior refers to "key" actions in clinical work. EPA, rooted in competency-based medical education, transforms abstract competency assessment into observable and measurable clinical tasks. It clarifies expected ability levels at different training stages, allowing teaching physicians to evaluate students by trust levels, with features of operability,

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executability, and assessability[6].

### *2.2. Core Concepts*

EPA has three core concepts: professional behavior, supervision level, and trust decision[12]. Professional behavior involves students' professional knowledge, communication attitudes, and operational skills for task completion; supervision level indicates the degree of assistance or trust needed by students during professional behavior; trust decision[13] shows supervisors' confidence in students handling clinical tasks.

### *2.3. Application Status*

EPA was first used in post - graduate education for residents[14], then expanded to undergraduate medical education, continuing education, and animal health[15,16]. In 2014, the AAMC listed 13 core EPA indicators for medical students before residency training, including history taking, physical examination, and differential diagnosis[17-19]. In 2015, the AFMC proposed 12 essential EPA indicators for medical graduates[20]. The same year, AMEE's guidelines summarized EPA research, with core EPAs offering a valuable framework for clarifying clinical expectations of medical graduates[21-23].

In standardized residency training abroad, EPA are widely used and studied through empirical research[24-26]. These studies offer recommendations on EPA implementation[27,28], assess their effectiveness across educational stages[29], design the EQual tool to ensure EPA quality[30], and create unique Royal College EPA[31].However, EPA research in China is still in its early stages[32]. Current studies mainly focus on defining EPA and adapting them to the domestic context[33,34]. There is a lack of empirical and localization studies in this field.

## 3. Current Status of Entrustable Professional Activities Assessment Indicators in Standardized Residency Training

### *3.1. Development of EPA Assessment Indicators in International Residency Training*

International scholars have developed EPA frameworks for residency training across specialties using modified Delphi methods or mixed-method approaches. In the United States, 19 EPA for physical medicine and rehabilitation emphasized bridging competency-based medical education with clinical practice[35]. Canadian researchers established 29 internal medicine EPA spanning transitional to practical stages, enhancing assessment reliability and clinical relevance[36]. Japanese studies defined 8 nephrology EPA and 20 EPA for death declaration, emphasizing core tasks and reflective skills[37,39]. A German team designed 29 surgical EPA for Ethiopia, shifting training from time-based to outcome-oriented models[38]. Swiss cross-sectional research validated 18 geriatric psychiatry EPA, highlighting needs for structured supervision and teaching[40].

### *3.2. Development of Entrustable Professional Activity Assessment Indicators in China*

Domestic studies constructed EPA systems via Delphi consultations, analytic hierarchy processes, and literature reviews.A Peking University team established 15 cross-disciplinary EPA with 5 entrustment levels,addressing heterogeneous training goals across specialties[41-43].Beijing Huilongguan Hospital quantified psychiatric EPA' weights,offering evidence-based assessment criteria[44-46]. Zhongda Hospital developed 10 obstetrics/gynecology EPA integrated with milestone evaluations to enhance clinical competence[47].China-Japan Friendship Hospital optimized 17 entry-level EPA,enabling dynamic process assessments via informatized management[48].These frameworks provide actionable tools for standardized and individualized residency training in China.

These studies present diverse EPA development methodologies with defined entrustment levels. While enhancing training precision and practicality,their implementation necessitates coordinated resources,specialized expertise,and technological support.Multimodal strategies may optimize educational and assessment outcomes in residency programs.

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## 4. Comparison and Analysis of Entrustable Professional Activities in Standardized Residency Training: Domestic vs. International Perspectives

### *4.1. Comparative Overview of EPAs in Domestic and International Standardized Residency Training Programs (See Table 1)*

*Table 1: Comparison of the Basic Situation of EPA in Postgraduate Medical Education between Different Countries.*

| Author | Country | Year | Development Method or Tool | Applicable Role | Number | Levels |
|---|---|---|---|---|---|---|
| Michael Mallow et al. | USA | 2017 | Literature review, modified Delphi method | Physical Medicine and Rehabilitation | 19 | 5 |
| David R.Taylor et al. | Canada | 2018 | Delphi method | Internal Medicine | 29 | 5 |
| Elske Hissin et al. | Japan | 2021 | Modified Delphi method | Nephrology | 8 | None |
| Equlinet et al. | Germany | 2022 | Exploratory sequential mixed-methods design, Delphi method | Surgery | 29 | None |
| Takaomi al. | Japan | 2022 | Literature review, modified Delphi method | Death Certification | 9 | None |
| Seraina et al. | Switzerland | 2023 | Cross-sectional mixed-methods,group discussions | Geriatric Psychiatry | 18 | None |
| Qi Xin et al. | China | 2021 | Delphi method | Residents | 15 | 5 |
| Zhang Ligang et al | China | 2023 | Semi-structured interviews, Delphi method | Psychiatry | 17 | None |
| Zhang Qinfen et al. | China | 2024 | Focus group surveys | Obstetrics and Gynecology | 10 | 5 |
| Tan Meimei et al. | China | 2024 | Delphi method | New Residents | 17 | 5 |

#### *4.1.1. Methodological Approaches*

Both domestic and international studies commonly employ literature reviews and Delphi methods for EPA development. International research further incorporates mixed-methods designs,offering methodological innovations for domestic applications.

#### *4.1.2. Scope of Application*

Internationally,EPA demonstrate maturity across specialties, including physical medicine, internal medicine, and surgery.In contrast,domestic efforts primarily focus on general residency programs and specialized frameworks.Future work should expand discipline-specific EPA development tailored to China's clinical training needs.

#### *4.1.3. Indicator Quantity*

International EPA frameworks vary from 9 to 29 indicators, reflecting specialty-specific granularity. Domestic studies report 10–17 indicators,suggesting localized refinement.Studies suggest[49] that 20–30 indicators are optimal, as excessive numbers may compromise assessment validity[14].

#### *4.1.4. Entrustment Levels*

A standardized 5-level entrustment scale is universally adopted:Observation only;Execution under direct supervision;Indirect supervision with partial guidance;Independent practice;Supervising others[7].

### *4.2. Cross-National Comparisons of EPA Indicators ( See Table 2)*

Shared Features:Core clinical competencies-history-taking, physical examination, and diagnostic interpretation-are consistently prioritized, ensuring foundational skill standardization across specialties.

Divergent Aspects:International EPA emphasize clinical proficiency and patient care,aligning with competency-based training paradigms.Domestic frameworks additionally integrate teaching and research requirements,reflecting China's emphasis on holistic physician development.Specialty-specific EPA further diverge in granularity, driven by distinct clinical workflows and professional expectations.

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## 5. Application Value of Entrustable Professional Activities

EPA bridge the gap between competency acquisition and clinical practice by enabling targeted,stage-specific feedback to enhance physician competence[50].

### *5.1. Guiding Diversified Development of Competency Assessment Tools*

Current EPA research in China remains nascent in localization and regional adaptation. Future studies should prioritize qualitative and quantitative validation of existing EPA to address diverse medical education needs across regions and cultures. Additionally, developing specialty-specific EPA is critical to advancing multidisciplinary and professionalized medical education,ultimately strengthening China's medical talent pipeline.

### *5.2. Innovating Medical Training Curriculum Design*

As a frontier in medical education,EPA enhance the relevance and effectiveness of residency training. Their integration into competency-based workplace curricula[51] fosters alignment with clinical demands.Technology-enhanced approaches-such as digital assessment platforms and adaptive learning systems-further enable personalized educational pathways and real-time feedback,optimizing training outcomes.

### *5.3. Enhancing Physician Competence and Professional Growth*

The Healthy China initiative and the "New Medical Education" reform emphasize lifelong learning and career development[52].EPA support this vision by providing continuous assessment,enabling residents to progressively develop independent practice under supervised safety.This framework cultivates clinical decision-making,patient care,teamwork,and self-directed learning,fostering well-rounded physicians with high professional standards.

## 6. Conclusion

The application of Entrustable Professional Activities (EPAs) in standardized residency training constitutes a multidimensional and systematic process. It not only provides learners with a clear pedagogical framework but also delineates their developmental trajectories. This paradigm shift signifies the transition from traditional time-based educational models to competency-oriented evaluation systems, charting a new pathway for the coordinated advancement of medical education in China. Comparative analyses between domestic and international contexts reveal that further exploration is required in three key areas: localized adaptation of specialty-specific EPAs, development of validated assessment instruments, and effective integration with information technologies. These advancements will optimize curricular architecture, enhance focused implementation of EPAs in clinical practice, and ultimately improve residents' clinical competencies while fostering self-directed learning capabilities.

The adoption of EPAs epitomizes the transformation towards personalized and competency-driven medical education. By establishing EPAs, medical educators have successfully addressed the challenge of competency assessment while achieving seamless integration between educational objectives and clinical workflows, thereby providing residents with explicit developmental benchmarks. Looking ahead, Chinese medical education must prioritize three strategic initiatives: 1) context-specific refinement of EPAs frameworks through evidence-based localization; 2) innovation in multidimensional assessment tools incorporating psychometric validation; 3) digital transformation of training systems via smart education technologies. These measures will cultivate globally competitive yet locally relevant medical professionals, offering innovative perspectives for educational reform and policy development in China's healthcare ecosystem.

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*Table 2: Comparison of EPA in Standardized Residency Training Between Domestic and International Contexts.*

| | Foreign | | | | | | China | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| EPA Indicators | Physical Medicine and Rehabilitation | Internal Medicine | Nephrology | Surgery | Death Certification | Geriatric Psychiatry | Residents | Psychiatry | Obstetrics and Gynecology | New Residents |
| Taking medical histories | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ |
| Performing physical examinations | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ |
| Selecting and interpreting ancillary tests | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ |
| Making diagnoses and differential diagnoses | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ |
| Making treatment decisions | √ | √ | √ | √ | | √ | √ | √ | √ | √ |
| Writing medical records | | | √ | | | | √ | √ | √ | √ |
| Reporting cases | | | √ | | | | √ | √ | | √ |
| Identifying and handling common clinical problems | √ | √ | √ | √ | | √ | √ | √ | √ | √ |
| Identifying and managing critical and emergency conditions | | √ | | √ | | √ | √ | √ | √ | √ |
| Patient transfer and handover | | √ | | √ | | √ | √ | √ | | √ |
| Informed consent | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ |
| Basic procedures | √ | √ | | √ | | √ | √ | √ | √ | √ |
| Health education | √ | √ | | √ | | √ | √ | √ | | |
| Communicating with patients and medical staff | √ | √ | √ | √ | √ | √ | √ | √ | | √ |
| Clinical teaching | | √ | | | √ | √ | √ | √ | | |
| Clinical research | | | | | | | | | √ | |
| Reflecting physician's basic qualities | | | | | √ | | | | √ | √ |
| Responding to public health events | | √ | | | | | √ | | | √ |