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Implementation of entrustable professional activities for interns within the new Australian National Framework: a pilot study using action-research to explore utility, and clarify challenges and enablers

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Abstract

Background Programs worldwide are introducing programmatic assessment and Entrustable Professional Activities (EPAs) with strong theoretical foundations and growing research evidence regarding potential benefits. In Australia, the new National Framework for Prevocational Medical Training includes four EPAs for doctors in PGY1-2, who rotate through different specialties to gain broad experience: EPA1:Clinical assessment, EPA2:Recognition and Care of the Acutely Unwell Patient, EPA3:Prescribing, EPA4:Team communication. Little is known about how this new education model will work in practice. Hence a pilot study was conducted to (1) Investigate how feasibility, acceptability, educational value and overall utility of EPAs can be maximised, and (2) Clarify challenges and enablers of EPA implementation, operationalised via EPA assessments.

Methods The study was conducted during intern terms 2–4, 2024 (10 weeks each) in a metropolitan health service. EPA assessments (EPAA) were implemented for interns working in eleven medical units across four specialties (medicine, surgery, mental health, emergency). Change strategies were designed using Kotter's 8-step and COM-B models. Action-research methodology was used and each 5-week cycle involved: enacting plans, gathering user data, analysing data, and co-designing improvements with expert and stakeholder panels. Quantitative and qualitative user data were collected from all EPAA e-forms, plus surveys and focus groups conducted each cycle.

Results In total, 738 EPAAs were submitted by 119 interns and 283 assessors. The frequency order was: EPA1(highest)-EPA4-EPA3-EPA2. The majority took 10 min or less to complete, and most were assessed by registrars, except in Emergency where consultants predominated. EPAA activity varied substantially across individual units, even within one specialty. User perspectives indicated that EPAAs' educational value depended primarily on the quality of the

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feedback discussion. Key challenges identified were establishing a trained assessor cohort, fitting EPAAs into workflow, refining the form design and rating scale (National Framework scale used in Phase 1 and modified Ottawa-scale in Phases 2–3). Multiple revisions to implementation were co-designed and executed across the pilot. Practical strategies to support implementation were clarified.

Conclusions This large pilot provides valuable insights into EPA implementation according to the National Framework. Clarifying challenges and enablers may assist others. Optimising EPAA quantity, rating scale, form and feedback quality is important due to impacts on realising educational value and providing robust performance data for progress decisions.

Keywords Entrustable professional activities, Intern, Resident, Postgraduate training, Professional education, Implementation study, Change process, Action research

Background

Programs worldwide are introducing programmatic assessment with Entrustable Professional Activities (EPAs) [1–4]. An EPA is a core professional task that trainees can be entrusted to execute once proficiency is established [5–7]. It requires integration of multiple competencies tailored to a specific clinical scenario and links increasing clinical capability with progressive trust for autonomy [8]. In Australia, the National Framework for Prevocational Medical Training, designed by the Australian Medical Council (AMC), was introduced in 2024 and involves a new two-year foundational clinical training program [9, 10]. Prevocational trainees are doctors in postgraduate years one and two (PGY1-2), who rotate through 10–12 week terms (clinical rotations) in different specialties to gain broad experience. Currently, this occurs predominantly in public hospitals where a set of inpatients is managed by a medical team, which includes an intern (PGY1), resident (PGY2-4), registrar (PGY4-8, specialty / subspecialty trainee) and a consultant (medical specialist).

The Framework introduces four EPAs: EPA1:Clinical Assessment, EPA2:Recognition and Care of the Acutely Unwell Patient, EPA3:Prescribing and EPA4:Team Communication. The AMC requires prevocational trainees to complete at least ten EPA assessments (EPAA) involving all four EPA types each year, with a minimum of two per term including one EPA1 and one with a consultant supervisor (registrars and other health professionals can be assessors). Components of the Framework have been gradually phased in, with EPAAs finally mandated for PGY1 and PGY2 in 2026 across Australia. Interns undertake EPAAs in addition to mid- and end-of-term assessments, which were the only assessments required by the AMC prior to the Framework. EPAAs represent authentic assessment during routine clinical practice [11]. They can be initiated by prevocational trainees or their supervisors whenever a suitable opportunity arises during a shift. The process involves an observation, directly followed by trainee self-reflection, and developmental feedback discussion then completion of the form, including a performance rating using an entrustability scale [8, 12, 13]. The AMC form states "Supervisors are asked to make a judgement on the degree of entrustment for this task; the level of supervision required" to complete this work safely. The AMC scale has 3 levels: requires 'direct', 'proximal' or 'minimal' supervision.

EPAs are closely aligned with Programmatic Assessment, which selects various assessments, considering each one's strengths and limitations, to create a program of assessment mapped to learning outcomes [8, 14]. Individual assessments are primarily designed as learning opportunities. The set of assessments informs summative progress decisions by a competency committee, such as a recommendation for General Registration at the end of PGY1 by the Assessment Review Panel (ARP) in the Framework. This enables robust decisions by triangulating information meaningfully across multiple assessment types, cases, contexts and assessors [15, 16]. Emerging evidence shows that EPAAs, as part of a broader program of assessment, can provide robust data on an individual's trajectory and achievement levels, plus insights into training program quality [17–20].

EPAs and programmatic assessment are gaining popularity, and there is a small, but expanding, set of research studies analysing implementation in different settings including medicine and other health professions [18–26]. However, little is known about using EPAs in an Australian context with prevocational doctors rotating through different clinical specialties. This is important, as introduction of the Framework with EPAs requires additional training activities in hospitals that are primarily focused on healthcare delivery with limited educational resources. The theoretical considerations behind this are sound but it is essential to investigate how this new education model works in reality. In practice, EPAs become operationalised through EPA assessments, which document observations, feedback discussions and entrustment decisions. Consequently, studying the implementation of EPAs in clinical settings necessarily involves examining how the assessments are conducted, integrated into workflow and experienced by supervisors

and trainees. These insights can inform any refinements required to achieve the Framework's objectives. Hence a pilot program was conducted to investigate ways to maximise feasibility, acceptability, educational value and overall utility of EPA implementation, operationalised via EPA assessments [27]. Challenges and enablers were clarified with the aim of sharing practical insights. The research questions were.

1. How can the utility of EPAs, operationalised through EPA assessments, be maximized?
2. What are the challenges and enablers to the implementation of EPA assessments in prevocational medical training?

Methods

This study was conducted between March-November 2024, across Intern Terms 2–4 of a 5 term year (hereafter Pilot Phases 1–3) at a multi-site metropolitan public health service with 125 interns (PGY1). After gaining hospital leadership and medical unit head support, EPA assessments were introduced in 11 units:3 General Medicine (Internal Medicine), 3 General and Gastrointestinal Surgery, 3 Mental Health, 2 Emergency units. Units were enrolled in three stages, every 5 weeks to coincide with the start of an action research cycle: Phase 1 week 1 - five units; Phase 1 week 6 - four units; Phase 2 week 1: two units. These units had the greatest numbers of interns across the health service sites, and a consultant with dedicated time to support prevocational training (prevocational unit supervisor: PVUS). Interns and assessors (registrars, consultants, and pharmacists) working in these units could participate in the study.

Implementation was led by the Medical Education Unit (MEU) (CJ) with a dedicated EPA Implementation Team (EPA consultant and fellow, both half-time) (SS then VA; AW then RM) plus researchers (AB, SM). Strategies were informed by Kotter's 8-Step Change Management Model [28], and the COM-B model [29] to promote behavioural change by enhancing capability, opportunity, and motivation. The Kotter and COM-B frameworks informed both implementation strategies and interpretation of emerging barriers and enablers. Specifically, COM-B provided a lens to analyse whether barriers reflected limitations in capability, opportunity or motivation; while Kotter's framework guided leadership engagement, communication strategies and reinforcement of behavioural change. Action research methodology was used to enable swift and iterative improvement cycles incorporating stakeholder inputs, as had been successfully used for EPA implementation in other health professions [23]. Across the pilot, there were six action research cycles with two cycles in each phase. One cycle lasted 5 weeks and involved four steps: 1. implementing a plan, 2. gathering user data, 3. analysing and triangulating data from multiple sources, and 4. co-designing improvements with an expert panel and a stakeholder panel for implementation in the subsequent cycle (Fig. 1). The expert panel consisted of EPA experts (JF, BC, LS, DC) to provide authoritative insights. The stakeholder panel consisted of participating interns and assessors, so improvements were workable and endorsed by users.

Quantitative data were extracted from EPAA e-forms and analysed using Microsoft Excel. Qualitative user-experience data were collected from free-text comment boxes on each form; evaluation surveys circulated in week 5 and 10 via an anonymous web link (SurveyMonkey); and focus groups in week 8 held separately for interns, registrars and consultants (all participants in each Phase were invited) (Fig. 2) (Table S1 contains exemplar questions). Focus groups were conducted each term to capture evolving experiences, which were used to inform subsequent implementation refinements, rather than aiming for thematic saturation at a single time point. The focus groups were facilitated by MEU researchers, who had a dietetics background, expertise in health professions education and research (HPE/HPER), and were not involved in intern assessment. Focus group data were analysed by the research team using inductive thematic analysis underpinned by a social constructivist

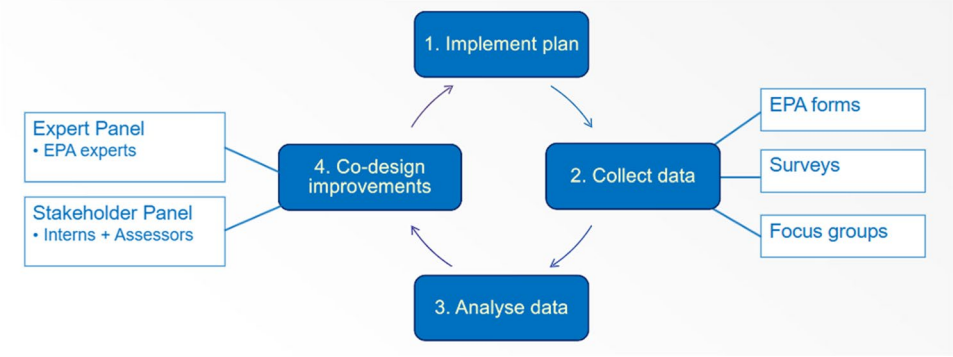

Fig. 1 The four-step action research cycle

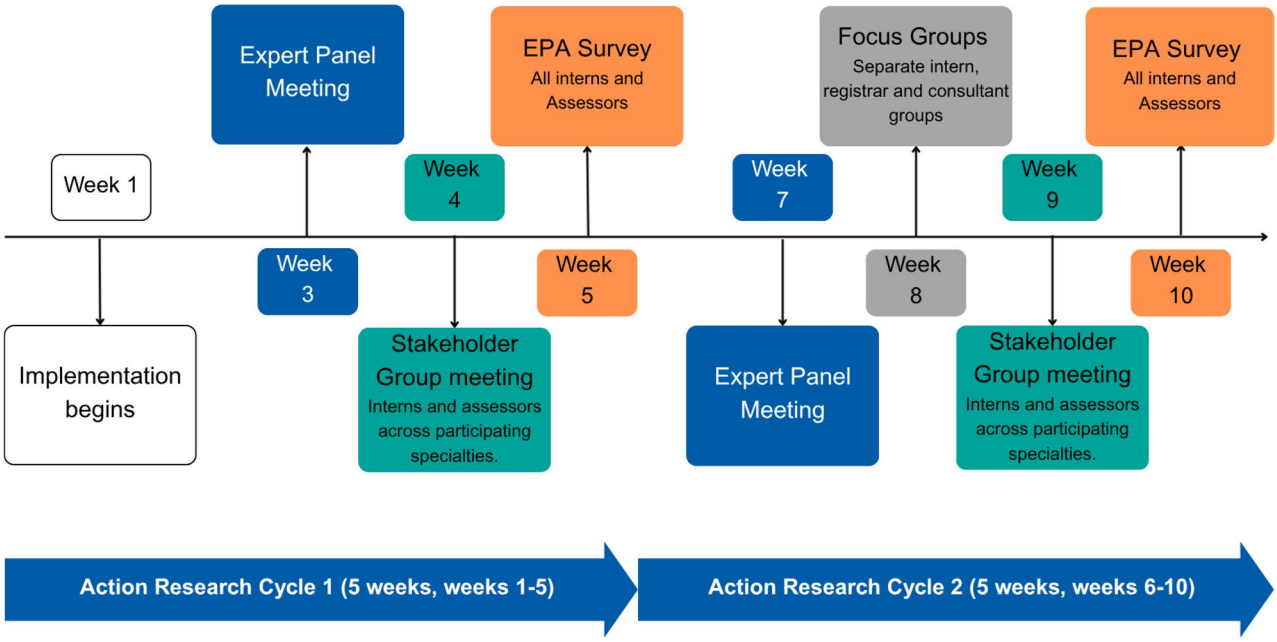

Fig. 2 Action research timeline of two cycles across one Phase (one intern term). User data collected weeks 1-5, data analysed and used to develop improvements co-designed with the Expert Panel in week 7 and Stakeholder Panel in week 9, then implemented in week 1 of the subsequent term

framework [30, 31]. Transcripts were independently coded by two researchers (AB, SM) using inductive thematic analysis. Initial codes were discussed and refined through iterative team discussions, and themes were developed through consensus. The research team recognised and discussed the influence of their own perspectives on data interpretation, which involved the MEU researchers (AB, SM), Director (CJ: working physician with experience in HPE/HPER) and the Implementation Team (SS, VA: working physicians with experience in HPE, and AW, RM: fellows in MEU and clinical units). The Implementation Team collected anonymised field notes to record their ad-hoc conversations and observations in clinical units (Table S2 describes data collected).

The study protocol was granted exemption from the hospital Human Research and Ethics Committee as a quality assurance project (ERM 106270), in compliance with the National Health and Medical Research Council (NHMRC) Ethical Considerations in Quality Assurance and Evaluation Activities (2014) guideline and the Declaration of Helsinki. Hence written informed consent was not required from participants. Information on data use was provided to survey and focus group participants.

Results

During Phases 1–2 (implementation), the MEU proactively provided units with training, resources, activity data and ongoing support including site visits. All training sessions included an overview of the National Framework, the four EPAs, the purpose and role of EPA assessments, responsibilities for interns and assessors, examples of suitable tasks, and the assessment process including entrustability scale rating and feedback discussion. Designated pharmacist assessors started in Phase 2, after customised training that focused on EPA3 (prescribing), and contrasting prevocational training EPAs with pharmacy EPAs, as pharmacy EPAs are competency assessments. In Phase 3 (consolidation), MEU input was substantially decreased closer to business-as-usual levels to provide insights on real-world feasibility and sustainability. See Table S3 for detailed description of strategies and refinements across each Phase.

Participants

EPAAs were submitted by 119 of 124 interns (96%) who worked in enrolled clinical units, with 283 unique assessors comprising 104 consultants, 169 registrars and 11 pharmacists across the three phases. In total, six evaluation surveys were circulated, sent to all interns and assessors who submitted EPAAs in each Phase, with 71 intern and 31 assessor responses (Table S3a and S3b). Twelve focus groups were conducted involving 30 interns, 14 registrars and 15 consultants. To maximise participation, sometimes a second focus group for a specific target group was run at a different time during week 8, and an extra one was run at the end of the study for interns who participated in all three phases (5 attended of 10 who met this condition). Table S5 contains illustrative quotes from forms, surveys and focus groups. There were 7 expert and stakeholder panel meetings.

Table 1 Total number of EPA 1–4 assessments across three phases of the pilot

	Phase 1 Intern Term 2 ***(% Phase total)***	**Phase 2 Intern Term 3** ***(% Phase total)***	**Phase 3 Intern Term 4** ***(% Phase total)***	**Pilot Total Phases 1–3** ***(% Pilot total)***
EPA 1	82 *(39%)*	114 *(38%)*	95 *(42%)*	**291*(39%)***
EPA 2	10 *(5%)*	23 *(8%)*	19 *(8%)*	**52*(7%)***
EPA 3	50 *(23%)*	68 *(23%)*	38 *(17%)*	**156*(21%)***
EPA 4	71 *(33%)*	92 *(31%)*	76 *(33%)*	**239*(32%)***
All EPA assessments	**213**	**297**	**228**	**738**

EPA 1: Clinical Assessment, EPA 2: Recognition and care of the acutely unwell patient, EPA 3: Prescribing, EPA 4: Team communication

Table 2 EPA 1–4 assessments according to assessor

	Consultant	**Registrars**	**Pharmacists**	**Total**
EPA 1 *(% per assessor group)*	114 *(39%)*	177 *(61%)*	0 -	**291**
EPA 2 *(% per assessor group)*	9 *(17%)*	43 *(83%)*	0 -	**52**
EPA 3 *(% per assessor group)*	28 *(18%)*	100 *(64%)*	28 *(18%)*	**156**
EPA 4 *(% per assessor group)*	89 *(37%)*	150 *(63%)*	0 -	**239**
Total EPA 1–4 *(% per assessor group)*	**240*(32%)***	**470*(64%)***	**28*(4%)***	**738**

EPA assessment activity

In total 738 EPA assessments were submitted (Table 1). The most frequent was EPA1, followed by EPA4, EPA3 and EPA2. Overall, registrars did the majority of assessments across all EPA types: 470/738 (64%) (Table 2). In Emergency, consultants assessed 134/179 (75%) EPAs; beyond Emergency, registrars assessed 429/559 (77%) EPAs.

Unit EPA assessment activity

Generally, EPAA activity was lowest in Phase 1 when clinical units were progressively enrolled; highest in Phase 2 with all units participating and full MEU input; then decreased, markedly in some units, in Phase 3 (Table 1; Fig. 3). EPA activity varied substantially across individual units, even within the same specialty, for example comparing Emergency Units 1 and 2, or Surgery Units 1 and 3. Of note, the prevocational unit supervisor (PVUS) in Surgery Unit 3 mandated 10 EPAAs in his unit.

Assessment activity targets

For the pilot, the target for each intern was set as 5–10 EPAAs per term, deliberately higher than the AMC minimum of 2 EPAAs per term, with the aim of increasing educational opportunities related to the feedback

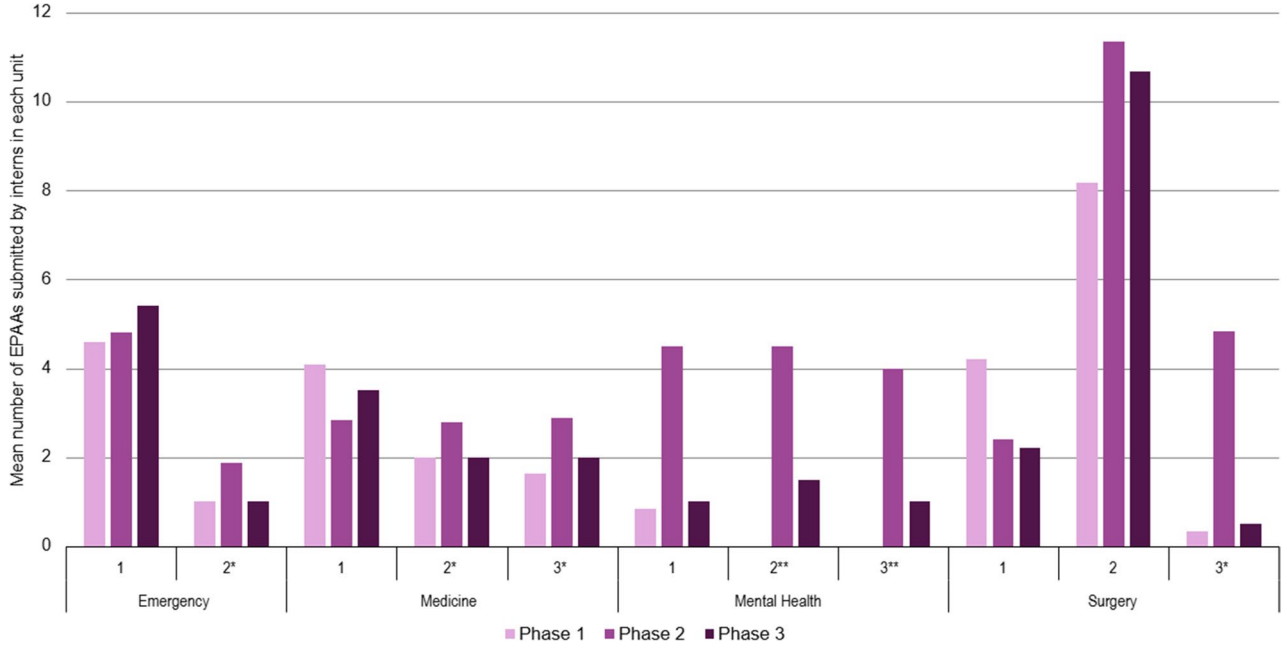

Fig. 3 Mean number of EPA assessments per intern in each clinical unit in each Phase
*Units commenced at Phase 1 Week 6 (mid-point of Phase 1). **Units commenced at Phase 2 Week 1

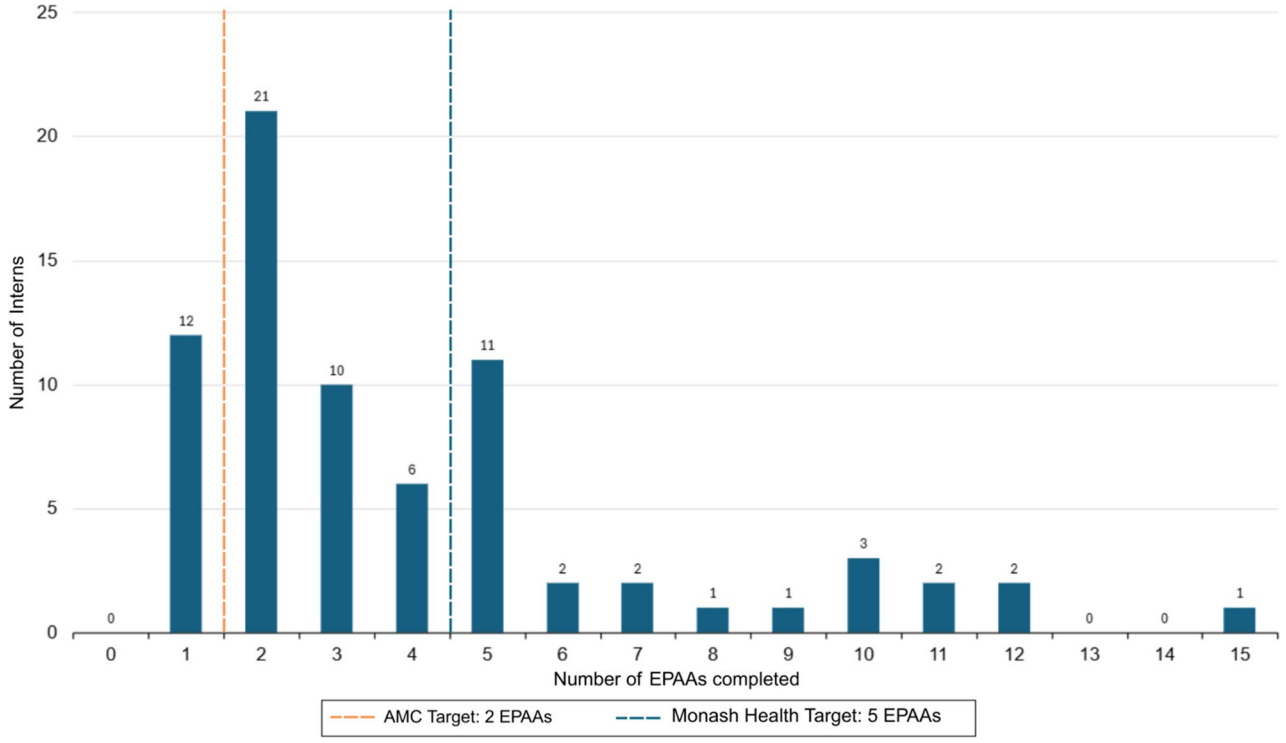

Fig. 4 Distribution of the total number of EPA assessments submitted by each intern in Phase 2

Table 3 Mean reported duration according to EPA type

	EPA 1	EPA 2	EPA 3	EPA 4	Total
Mean duration in minutes *(SD)*	8.5 *(4.9)*	8.6 *(5.4)*	8.5 *(4.8)*	8.5 *(5.2)*	**8.5*(5.0)***

Table 4 Mean reported duration according to assessor group

	Consultant	Registrar	Pharmacist	Total
Mean duration in minutes *(SD)*	9.2 *(4.8)*	7.9 *(4.9)*	12.5 *(5.5)*	**8.5*(5.0)***

Table 5 Mean reported duration according to specialty unit

	Emergency	Medicine	Surgery	Mental Health
Mean duration in minutes *(SD)*	8.9 *(5.0)*	8.4 *(4.2)*	7.0 *(3.9)*	14.8 *(7.7)*

discussion accompanying each EPAA. This was a more formative approach (as each assessment is only one amongst many), and an annual total closer to established programs elsewhere [4, 18, 26, 32]. In Phase 2 during peak activity, 63/75 (84.0%) interns submitted at least 2 EPAAs and 26/75 (34.6%) of interns submitted at least 5 EPAAs (Fig. 4). In focus groups, most interns and assessors felt 5 EPAAs per term was a realistic target and a range of 5–8 EPAAs was reasonable. Interns felt higher targets would promote anxiety, selection of easy tasks and rushed feedback. Consultants were concerned about their increasing assessment load across interns, residents and registrars. See Table S5 for illustrative quotes.

Assessment duration

Overall, the reported duration was 10 min or less for 615/737 (83.4%) EPA assessments, to complete the observation and feedback discussion, as recorded on the e-form at the time of the EPAA. The mean duration was similar across EPA1-4; shortest with registrar and longest with pharmacy assessors; shortest in surgery and longest in mental health (Tables 3, 4 and 5). In the Phase 3 survey, no respondents rated the time taken to complete an EPA as too long.

Assessment form

An e-form (JotForm: jotform.com) was created by transposing the AMC paper form, as the national e-portfolio was not available at the time. In Phase 1, many users expressed dissatisfaction with the form, stating it was 'clunky', 'too long' and 'requests repeat information'. Interns reported that when assessors seemed frustrated by the form questions or waiting while interns completed the demographic and self-assessment sections, this deterred interns from requesting further assessments. From Phase 2, the e-form was progressively revised to enhance usability, especially with smart phones that were predominantly utilised (example of improvement in Fig. 5; full details in Table S3). Subsequently, complaints dwindled and in the Phase 3 survey 26/42 (61.9%)

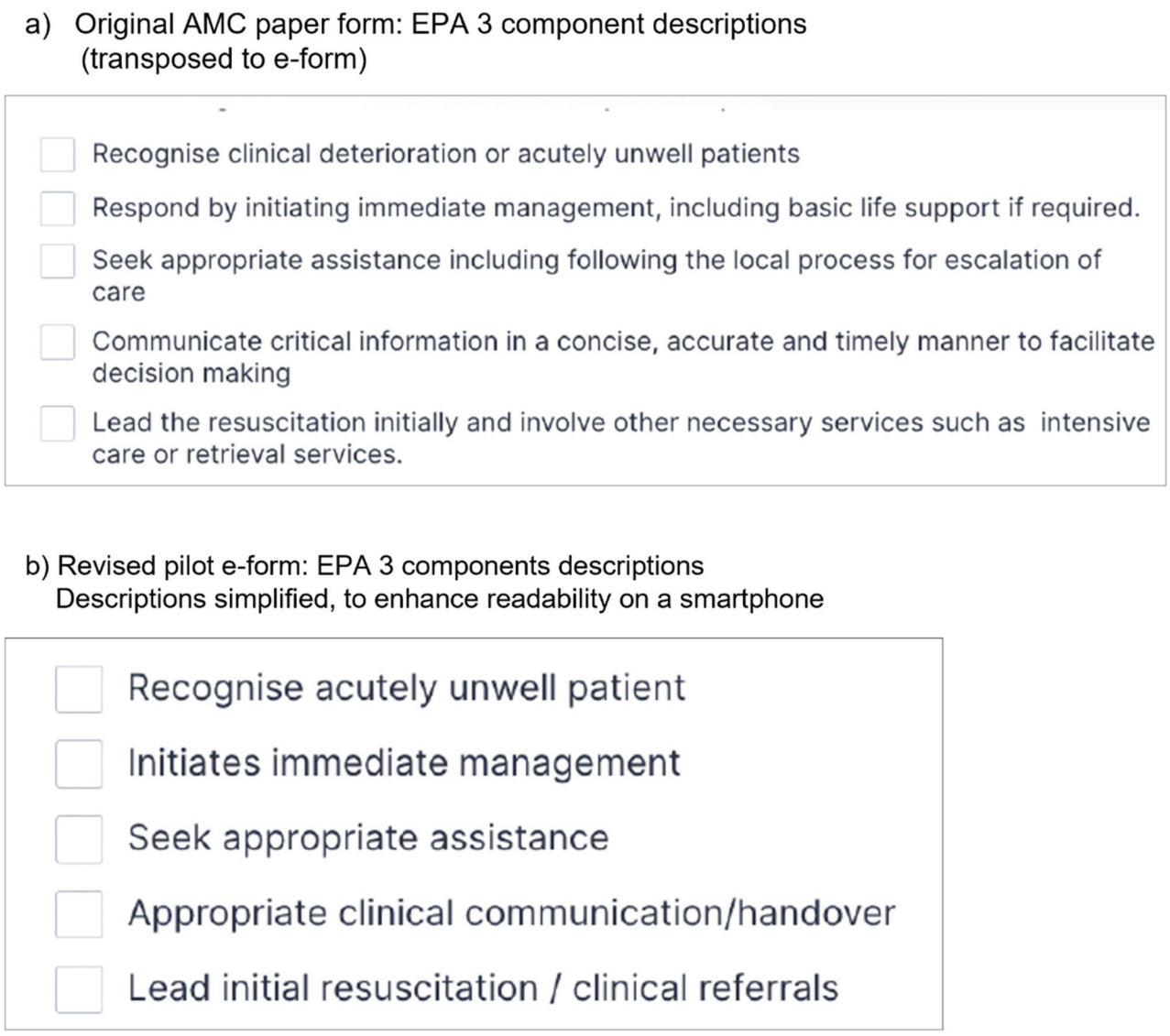

Fig. 5 Example of EPAA form revisions to enhance readability. Part a) shows EPA3 component descriptions on the original AMC form and Part b) shows EPA3 component descriptions on the revised pilot e-form

respondents rated the form as easy to complete (plus 11/42 (26.2%) rated 'neutral').

MEU modified the form feedback instructions to encourage documentation of specific and practical suggestions for improving performance, aiming to promote quality feedback outcomes (Fig. 6).

Entrustability scale

In Phase 1 using the AMC 3-point scale, EPAA ratings were positively skewed, particularly with registrar assessors (Table 6). A detailed form review found 'minimal supervision' ratings were frequently discordant with narrative comments indicating issues with core aspects of the task.

From Phase 2, a modified Ottawa Surgical Competency Operating Room Evaluation (O-SCORE; hereafter Ottawa-scale) was trialled [33, 34]. It had 5 levels, with more options at higher proficiency levels and descriptions that more closely reflected practical stages of reducing supervision in clinical practice. Form instructions were revised to focus supervisors on assessing the level of supervisor input required to do the task safely 'this time' and set the standard at 'the end of intern year' (Fig. 7). In Phase 2, Ottawa-scale ratings showed a greater spread, as expected with more options, and the positive skew persisted (Table 7).

Surveys did not show one scale better reflected the range of intern performance (only one scale was used and rated by participants in each Phase). In focus groups, registrars explained they avoided lower ratings in case it triggered adverse consequences, such as the intern failing the term, and they usually rated an intern's 'typical

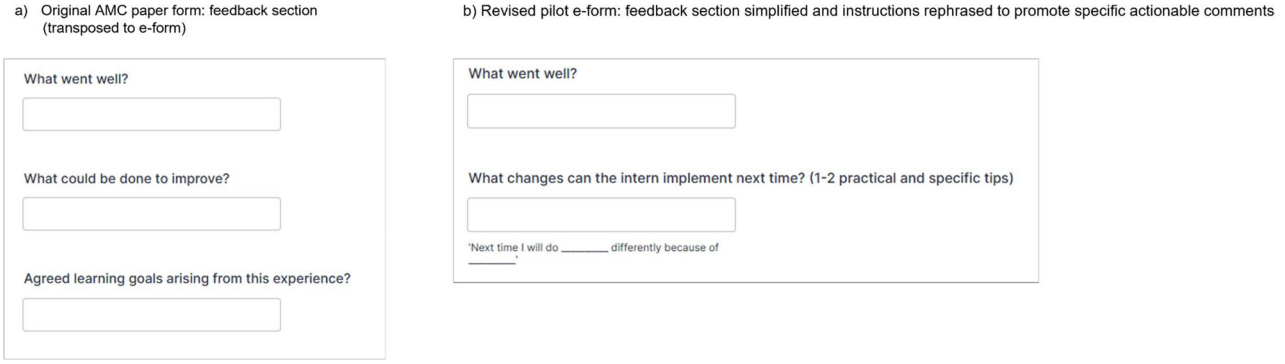

Fig. 6 Revisions to EPAA form feedback section. Part a) shows the feedback section on the original AMC form and Part b) shows the feedback section on the revised pilot e-form

Table 6 Entrustability ratings for EPA assessments. Phase 1: AMC scale ratings

	Consultant *(% Total)*	Registrar *(% Total)*
Direct Supervision	11 (15%)	7 (5%)
Proximal Supervision	37 *(51%)*	36 *(26%)*
Minimal Supervision	25 *(34%)*	96 *(69%)*
Total*	73	139

*One EPAA was excluded as it did not use the AMC Rating Scale

Table 7 Entrustability ratings for EPA assessments. Phase 2: modified Ottawa scale ratings

Modified Ottawa-scale in Phase 2	Consultant *(% Total)*	Registrar *(% Total)*	Pharmacist *(%Total)*
Do the task	4 *(5%)*	4 *(2%)*	0 -
Prompt or assist	6 *(7%)*	3 *(2%)*	0 -
Be there or full review	15 *(18%)*	8 *(4%)*	2 *(9%)*
Check key aspects	34 *(42%)*	66 *(34%)*	4 *(18%)*
I trust the intern	23 *(28%)*	112 *(58%)*	16 *(73%)*
Total	**82**	**193**	**22**

proficiency' at that task, not the specific clinical encounter observed, as intended. In focus groups when both scales were displayed, interns and assessors found the AMC instructions and rating level descriptions ambiguous, and assessors reported instances when they had wished to rate in between the 3 levels. Most preferred the Ottawa-scale, as 5 levels allowed greater differentiation and the descriptors were more clinically intuitive. Participants wanted a simple scale due to the high cognitive load of clinical practice, which promoted a few to advocate for a 3-point scale. Assessors struggled with an

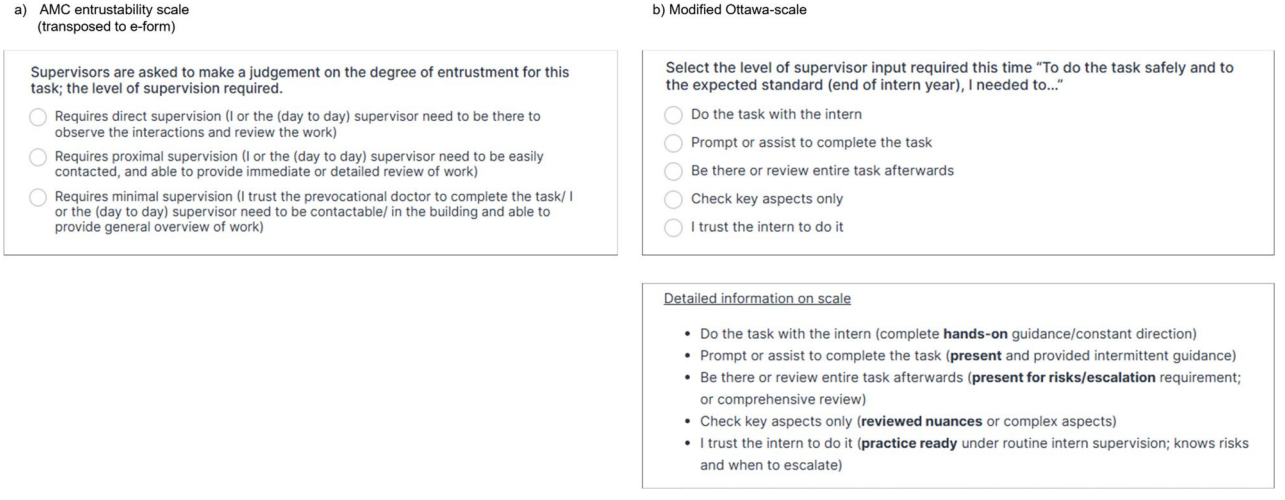

Fig. 7 Entrustability scales. Part a) shows the scale on the original AMC form and Part b) shows the modified Ottawa-scale. For the Modified Ottawa-scale, the detailed information box that provided a full description for each rating level, was positioned underneath the rating scale, which used summary phrases for easy reading on the e-form

indistinct 'required standard' especially across variable task complexity. See Table S5 for illustrative quotes.

Perceptions of educational value

Participants (including interns and assessors) appreciated the educational value of EPAs as they promoted interns' self-reflection, learning, understanding of role expectations and clinical proficiency across key areas of intern work. Participants commonly requested a procedural EPA. In focus groups, interns reported the educational value depended on the quality of the feedback discussion, and relied on an assessor's commitment to teaching despite being busy. Consultants reported EPAAs fostered relationships and enabled first-hand analysis of interns' capabilities. Participants considered EPAAs to be most beneficial when used for novel tasks or to encourage interns who felt hesitant to seek senior input. Some interns, who reported already proactively seeking feedback, felt EPAAs just created an administrative burden. See Table S5 for illustrative quotes.

Conducting assessments and incorporating them into the workflow

Participants widely reported difficulties completing EPAAs. Even in the Phase 3 survey, 21/35 (60%) interns reported they could not easily fit EPAAs into their day. When participants were not familiar with key concepts, suitable tasks or the process, assessments were stymied. This was an ongoing issue due to a high turnover within teams and difficulties delivering in-person assessor training due to consultants working part-time and little access to registrars. Substantial direct interactions did not routinely occur between interns and consultants on the wards, as consultants primarily interacted with registrars regarding clinical care, plus surgical assessors were predominantly in theatre. The lack of interaction also impeded building relationships, as interns depended on benevolence when asking consultants to make time for an assessment.

However, the dominant barrier to EPAAs was the high workload; even when plans were made, clinical demands meant assessments were often forgotten, or postponed.

Units trialled various local strategies to create assessment opportunities (see Table 8). Participants suggested EPAAs would be promoted if unit heads explicitly set expectations, targets were mandated, or assessors could count them towards professional development requirements. See Table S5 for illustrative quotes.

Change management: challenges and enablers

Across six action research cycles, multiple aspects of the implementation process were refined by the MEU team in collaboration with the expert and stakeholder panels, using assessment data and user comments to maximise uptake and utility of EPAAs. There was a strong focus on attending to participants' perspectives, difficulties and ideas for improvements throughout (Table S3 contains detailed descriptions of strategies and refinements across each Phase).

Based on Kotter's change model [28], steps to create a coalition with hospital leadership and clinical units included explaining the potential benefits of EPAs; proactively seeking and addressing concerns; providing training, resources and support; and collaboratively refining processes. Progress was monitored, with successes celebrated and effective strategies shared, and more intensive support provided for units with low EPAA activity. The COM-B model was used to encourage behavioural change [29]. Strategies were developed to increase capability (e.g. training sessions, unit visits to provide tailored assistance), motivation (e.g. highlight benefits for enhancing patient care, share positive experiences, circulate comparison of EPAA activity across units, promote 'growth mindset' [35]) and opportunities (e.g. publicise lists of suitable tasks, ways to fit into workflows). The strategies aimed to strengthen enabling factors (e.g. leadership support, setting clear expectations, enhancing EPAA proficiency), optimise educational value (focus on selecting tasks with valuable learning for EPAAs, rephrase form feedback instructions to request actionable tips), and counter inhibiting factors (e.g. enhance form to reduce frustration accessing or completing the form). Table 8 summarises key challenges and enablers.

Discussion

Introducing the National Framework with EPAs is the most significant change in Australian entry-to-practice medical training in 50 years, affecting all new doctors and their supervisors [10]. It aims to enhance the quality of training, create learning opportunities via feedback discussions based on direct observations, and promote life-long learning habits [9, 16]. Worldwide research has demonstrated that implementing EPAs can develop proficiencies faster, provide transparent justification for progress decisions, and facilitate analysis of training quality [17, 18, 20]. Yet policies rarely transfer seamlessly into practice [3, 26, 36, 37]. Exploring the gap between 'work as imagined' and 'work as done' enables implementation strategies to be refined to optimise outcomes and achieve objectives [38, 39]. To our knowledge, this study is the only published pilot of EPAs for interns in Australia, providing insights into utility, challenges and enablers in this setting.

Overall, the study found EPAAs were feasible. All four EPAs were assessed in substantial numbers across diverse specialties, and the reported duration was mostly ten minutes or less for completion. EPA2 assessments were the least common, likely to reflect an inability to schedule

Table 8 Challenges and enablers to enhance EPAA uptake

Challenges	Useful strategies as enablers
Lack of familiarity and capability with EPAs Training challenges - high turnover due to shift rosters and term rotations - many consultants worked intermittently, so missed sessions - limited access to registrar schedules to arrange sessions	Marketing, Education and Training *Broad* Frequent bulletins in hospital newsletter and intern tutorials to keep EPAs front of mind Unit heads: Presentations at hospital-wide meetings. PVUS: Regular workshop used for EPA training. Circulated Postgraduate Medical Council of Victoria assessor training videos, plus in-house 'how to' video as on-demand options. Interns: Education sessions during intern orientation week. *Unit-level* Posters displayed in doctors' offices as marketing, information and reminder. Education sessions scheduled into unit consultant meetings plus regular updates and ongoing support from EPA Consultant. Attempted to schedule education session into registrar training time. Roving EPA Fellow visited clinical units to proactively assist interns and assessors.
Identifying suitable tasks for EPAA	Created examples lists for EPA 1–4 in each specialty, which helped to 'translate' a broad EPA into work done by interns in the unit that is common, observable and educationally valuable. List advertised and widely accessible (via online links and hard copy).
Fitting EPAA into workflow Direct interaction between consultant and intern uncommon (except in Emergency) Surgical assessors predominantly in theatre Not customary to observe intern's work High workload with service delivery prioritised over education	On-site visits from EPA Fellow to assist participants to identify suitable tasks from their patient lists Some PVUS/ Consultants developed local solutions to arrange and conduct EPA assessments with consultant assessors: - communicate 'best time' for interns to flag EPAA requests (Medicine - start of a week; Emergency - start of a shift) - schedule a regular timeslot for EPAAs into timetable each week - split ward round so consultant and intern work together - message interns whenever consultant available (e.g. fortuitous quieter period or clinical support time) Include 'Unit EPA arrangements' as a specific topic on intern's 'Start of Term' discussion form. Inclusion of non-medical assessors with Pharmacists from Phase 2.
Responsibility and accountability for EPAA completion Each role typically attributed low EPAA activity to other's shortcomings	For a new system to function effectively, each role needs to play their part: - Unit Heads to set expectations for team to learn about and complete EPAA requirements. Expect assessors to say 'yes' if asked. Unit heads determined unit culture regarding the importance of education. - PVUS to work out practical ways to get EPA assessments done in the unit and communicate this during unit orientation. Provide support for individual assessors and interns to get EPAA done. - Interns to initiate EPA arrangements. - Everyone responsible for developing proficiency in EPAs and being proactive in conducting assessments. Interns instructed to ask about unit arrangements for EPAAs at unit orientation and initiate scheduling them.
Meeting EPA assessment targets Phase 1: Target '5–10' per term (1 x EPA1 and 2 with consultant) Phase 2–3: Target '5 minimum' per term (1 x EPA1 and 2 with consultant) Not mandated and no repercussions	Target set as an 'expectation' (but mandating numbers expected to be more effective; creates an education requirement as a counter-pressure to service requirements). Recommend interns to complete one EPAA in first fortnight of term to create an early deadline and reduce deferment. Follow up low EPAA activity to problem solve difficulties: MEU Fellow for Interns and MEU Consultant for Units Strategies to promote motivation - highlight value of EPAs for improved learning and quality of care - opportunity to participate in co-development of better processes - 'Treats and Glory' approach: EPA Fellow distributed chocolates when promoting EPAs during site visits. Public celebration of interns and units with high EPA activity. - Updates on EPA activity sent to individual interns and unit PVUS to enable monitoring. - Comparison table of EPA activity in different units circulated to foster competition. Training, user-friendly process, and support to reduce friction to conducting EPA assessments
EPA assessment form access and format	Optimal form is easy to access, read, navigate, complete and review. It efficiently records key information, including feedback discussion with development tips. Actions taken on user comments that initial form was clunky, long and repetitive: -Removed superfluous input requests and added drop-down lists for quicker completion. -Form optimised for mobile phone display and long phrases shortened to improve readability. -Feedback instructions revised to encourage 1–2 actionable tips -Enhanced accessibility via widespread access to link (online and print) and interns downloading form link to mobile home screen.

Table 8 (continued)

Challenges	Useful strategies as enablers
EPA scale Concerns regarding AMC scale	Action on concerns regarding AMC scale: only 3 options, level descriptions ambiguous, rating results skewed towards high entrustability despite assessor comments noting performance gaps. In Phases 2–3: modified Ottawa-scale trialled: 5 options describing practical stages of reducing supervisor input. Participants generally preferred Ottawa-scale but rating results remained skewed.
MEU department resourcing and input	Additional funding for MEU Implementation Team (0.5 EFT each EPA consultant and Fellow) Director MEU: collaborated with hospital and unit leadership to gain support and resolve problems. MEU Implementation Team: - Provided training, created resources and revised processes in collaboration with participants. - Acted as a single point of contact (via role messaging, phone, email). - Offered tailored assistance for individuals and small groups to address local barriers to EPA assessments. - Email and teams campaigns keep EPAs front of mind - Distribution of EPA completion tables and leader tables to units - Shared successful strategies between units. - Weekly visits to units on the wards (Phase 1 and Phase 2) by EPA fellow to promote EPAs

Abbreviations: *AMC* Australian Medical Council, *MEU* Medical Education Unit,*EPAA* Entrustable professional activity assessment, *PVUS* Prevocational unit supervisor

it, and prioritisation of clinical care over education during the management of acutely unwell patients. Future research could investigate ways to promote assessment of this important EPA, such as introducing retrospective case reviews, proactively involving Medical Emergency Teams or mandating a specific number of EPA2 assessments.

The study identified key determinants of feasibility included training, identifying relevant intern tasks, creating opportunities during the workflow and completing the assessment form. The educational concepts underpinning EPAs were new and represented a significant practice change [8]. Participants required tailored information, training, and ongoing support. It was difficult to establish a proficient assessor cohort due to the high turnover, invalidating a 'one-and-done' approach to training. Participants initially struggled to identify suitable tasks for assessments. This was helped by the creation of specialty-specific example lists for each EPA and coaching during MEU site visits [40].The study revealed consultants spent little time working directly with interns on patient care, except in Emergency where there was an established practice that interns presented each patient to the consultant. Hence the Framework necessitated new ways of working to enable EPAAs. The marked inter-unit variability in EPAA activity, even within specialties, suggested microcultures where unit leadership support for education was a potent enabler. Yet heavy workloads commonly overwhelmed plans for EPAAs. The difficulties outlined echo those encountered elsewhere when implementing EPAs, reflecting the major change process involved [3, 41–44].

Study participants appreciated the educational value of EPAs and thought all four EPAs targeted important aspects of interns' work. They pinpointed the feedback conversation as the crucial element for facilitating learning, a common finding in previous studies across multiple health professions [21, 23, 45, 46]. Hence quality feedback skills are vital for realising potential benefits from EPAs, yet expertise is variable in clinical practice [17, 47–54]. A further challenge is the impact of an assessment environment, which tends to result in learners' feeling more defensive. Rehearsing skills 'away from the spotlight' is lower risk and makes it easier for learners to fully engage with supervisors to develop their capabilities [55, 56]. Useful areas for future research include identifying how to enhance EPAA feedback conversations, such as optimising form feedback instructions, circulating exemplars of quality comments, and nurturing feedback proficiency include ongoing professional development training for educators and learners (particularly registrars and interns who are not routinely offered this type of training [51, 57].

Completing the form is an obligatory step in recording an EPAA, which adds to the assessment duration. In the study, when assessors expressed irritation with the form, interns reported it deterred them from arranging future assessments. This unintended consequence has been identified previously [42]. In our study, the form underwent multiple revisions to enhance access and design, and resolve complaints. Optimising form usability is crucial for minimising the administrative burden associated with EPA implementation [8]. These findings offer valuable insights for the national e-portfolio form design. It has a significant impact on the acceptability of EPAAs, which reflects the balance between educational value and inconvenience. Research has also highlighted tensions when using educators' comments on EPAA forms for both formative and summative purposes, as any summative use seems to dominate behaviour and diminish candour [45, 58–60].

Two entrustability scales were trialled in the pilot, including a modified Ottawa-scale that seemed to have some advantages [33, 34]. In focus groups, most participants preferred the modified Ottawa-scale for the clearer instructions and rating level descriptions, and broader

options, but some favoured a 3-point scale for simplicity. The modified Ottawa-scale descriptions also seemed to make sense across different specialties. However, EPAA ratings were positively skewed for both scales, particularly with registrar assessors. Additional research on the scale is warranted so descriptions intuitively reflect clinical practice, lower ratings are not perceived as demeaning, and learning curves can be demonstrated [12, 45, 61, 62].

Most interns achieved the Framework's target of 2 EPAAs minimum per term, but few achieved the pilot's target of 5–10 EPAAs per term. The target number was set deliberately higher than the AMC to allow exploration of feasibility and educational impact. Getting the number and mix of assessments right is important, and this will be a valuable objective for future research [15]. Too few curtails educational opportunities, raises the stakes for each one, and cannot create a rich picture of performance to inform competency committee decisions [3, 17, 20]. Yet, overassessment is deeply problematic, stimulating anxiety and a 'tick-box' mentality that diminishes learning when it lead to the selection of easy cases and rushed feedback [43, 46, 63]. Typically training programs have 10–30 EPAs mapped to cover all required learning outcomes and associated competencies [8, 16]. The AMC developed four broad EPAs and set a low assessment requirement in recognition of the limited educational resources available for prevocational training. Some important activities seem obscured within EPAs or are not specifically mentioned, such as 'oral case presentation to senior colleague', 'specific procedural skills' or 'interprofessional teamwork'. Additionally, mandating small numbers of assessments that target EPA subcomponents risks substantial gaps in monitoring performance.

Research strengths include the large number of participants across diverse specialties, using Kotter's and COM-B frameworks to leverage change, and employing action-research methodology to drive rapid improvement cycles in collaboration with users and based on triangulated data. However, the study involved one Australian metropolitan health service in the first implementation year before EPAs were mandatory and without an e-portfolio. Survey response rates were low and survey respondents may have been different from non-respondents, but user perspectives were gathered from wide sources including each EPAA form and field notes during site visits. Our hospital funded an implementation team within a high-quality medical education unit, plus ongoing prevocational unit supervisor roles, providing resources that may differ from institutions elsewhere. All these factors affect our study's relevance for others. Additionally, action research involves evaluation across a changing landscape. Many evidence gaps remain, particularly for second year prevocational trainees that work in more contexts and out-of-hours shifts in Australia.

Although conducted in a single health service, the challenges identified, such as workflow integration, assessor training, rating scale interpretation and feedback quality, are widely reported in studies of workplace-based assessment across health professions. Therefore, the implementation lessons identified are likely transferable to similar training contexts.

This study highlights that successful EPA implementation depends less on the EPA framework itself and more on the surrounding educational ecosystem. Effective implementation requires trained assessors, opportunities for observation within clinical workflows, user-friendly assessment tools and a culture that values feedback discussions. Without attention to these contextual factors, the educational benefits of EPAs may not be realised despite strong theoretical foundations.

Conclusions

This large pilot study offers early insights into the feasibility, acceptability, educational benefits and overall utility of EPAs for interns within the new National Framework in Australia. It has clarified challenges and many practical strategies that may assist others in similar contexts.

Abbreviations

EPA	Entrustable Professional Activity
EPAA	Entrustable Professional Activity Assessment
MEU	Medical Education Unit
PGY	Postgraduate year
PVUS	Prevocational unit supervisor

Supplementary Information

The online version contains supplementary material available at https://doi.org/10.1186/s12909-026-09349-7.

Supplementary Material 1: Table S1: Focus group questions. Table S2: Data collected during action research cycles. Table S3: Detailed description of strategies and refinements across each Phase. Table S4a: Participant Survey Results regarding feasibility, acceptability and educational impact of EPAs (results consolidate two surveys conducted across each Phase). Table S4b: Participant Survey Results (results combine two surveys conducted across each Phase). Table S5: Illustrative participant quotes from forms, surveys and focus groups.

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Authors' contributions

CJ contributed to the conception and design of the research, data analysis and interpretation, drafting and revising the article. AW contributed to the research design, data acquisition, analysis and interpretation, drafting and revising the article. VA contributed to the research design, data acquisition, analysis and interpretation, drafting and revising the article. SM contributed to the research design, data acquisition, analysis and interpretation, drafting and revising the article. RM contributed to the data analysis and interpretation, and revising the article. SS contributed to the research design, data acquisition and revising the article. JF contributed to the research design, data interpretation,

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Data availability
Most data generated or analysed during this study are included in this published article and its supplementary information files. Additional data are available from the corresponding author on reasonable request.

Declarations

Ethics approval and consent to participate
The study was reviewed and granted exemption from the Human Research and Ethics Committee as a quality assurance project (ERM 106270), in compliance with the NHMRC Ethical Considerations in Quality Assurance and Evaluation Activities (2014) guideline and the Declaration of Helsinki. Hence written informed consent was not required from participants. Information on data use was provided to survey and focus group participants.

Consent for publication
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Competing interests
The authors declare no competing interests.

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References

1. Bramley AL, McKenna L. Entrustable professional activities in entry-level health professional education: A scoping review. Med Educ. 2021;55(9):1011–32.
2. Van Melle E, Frank JR, Holmboe ES, Dagnone D, Stockley D, Sherbino J. A core components framework for evaluating implementation of competency-based medical education programs. Acad Med. 2019;94(7):1002–9.
3. Rich JV, Fostaty Young S, Donnelly C, Hall AK, Dagnone JD, Weersink K, et al. Competency-based education calls for programmatic assessment: But what does this look like in practice? J Eval Clin Pract. 2020;26(4):1087–95.
4. O'Dowd E, Lydon S, O'Connor P, Boland J, Offiah G, Byrne D. The development of a framework of entrustable professional activities for the intern year in Ireland. BMC Med Educ. 2020;20(1):273.
5. Van Der Vleuten CPM, Schuwirth LWT. Assessing professional competence: from methods to programmes. Med Educ. 2005;39(3):309–17.
6. Hennus MP, Jarrett JB, Taylor DR, Ten Cate O. Twelve tips to develop entrustable professional activities. Med Teach. 2023;45(7):701–7.
7. Ten Cate O, Taylor DR. The recommended description of an entrustable professional activity: AMEE Guide 140. Med Teach. 2021;43(10):1106–14.
8. Van Der Vleuten CPM, Schuwirth LWT, Driessen EW, Govaerts MJB, Heeneman S. Twelve Tips for programmatic assessment. Med Teach. 2015;37(7):641–6.
9. Australian Medical Council. New national framework for prevocational medical training [Available from: https://www.amc.org.au/accredited-organisations/prevocational-training/new-national-framework-for-prevocational-pgy1-and-pgy2-medical-training-2024/].
10. Crotty B, Glasgow NJ, Burnand J, Cooke G, Anderson K, White K, et al. National Framework for Prevocational Medical Training. Med J Aust. 2025;222(10):494–7.
11. Miller GE. The assessment of clinical skills/competence/performance. Acad Med. 1990;65(9 Suppl):S63–7.
12. Ten Cate O, Schwartz A, Chen HC. Assessing trainees and making entrustment decisions: on the nature and use of entrustment-supervision scales. Acad Med. 2020;95(11):1662–9.
13. Dewhirst S, Wood TJ, Cheung WJ, Frank JR. Assessing the utility of a novel entrustment-supervision assessment tool. Med Educ. 2023;57(10):949–57.
14. Schuwirth LWT, Van der Vleuten CPM. Programmatic assessment: From assessment of learning to assessment for learning. Med Teach. 2011;33(6):478–85.
15. Torre DM, SLW T, Van der Vleuten CPM. Theoretical considerations on programmatic assessment. Med Teach. 2020;42(2):213–20.
16. Lockyer J, Carraccio C, Chan MK, Hart D, Smee S, Touchie C, et al. Core principles of assessment in competency-based medical education. Med Teach. 2017;39(6):609–16.
17. Torre D, Schuwirth L. Programmatic assessment for learning: A programmatically designed assessment for the purpose of learning: AMEE Guide 174. Med Teach. 2025;47(6):918–33.
18. Schumacher DJ, West DC, Schwartz A, Li ST, Millstein L, Griego EC, et al. Longitudinal assessment of resident performance using entrustable professional activities. JAMA Netw Open. 2020;3(1):e1919316.
19. Pusic MV, Boutis K, Hatala R, Cook DA. Learning curves in health professions education. Acad Med. 2015;90(8):1034–42.
20. Bok HGJ, de Jong LH, O'Neill T, Maxey C, Hecker KG. Validity evidence for programmatic assessment in competency-based education. Perspect Med Educ. 2018;7(6):362–72.
21. Abeyaratne C, Galbraith K. Implementation and Evaluation of Entrustable Professional Activities for a Pharmacy Intern Training Program in Australia. Am J Pharm Educ. 2024;88(12):101308.
22. CroftH, Maundu J, Galbraith K, Nair BR, Wilkinson G, Clark B et al. Improving the effectiveness of workplace-based assessment for pharmacy interns, an evaluation study. Am J Pharma Educ. 2025;89(5). https://doi.org/10.1016/j.ajpe.2025.101390.
23. Bramley A, Forsyth A, McKenna L. Development and evaluation of Entrustable Professional Activities embedded in an e-portfolio for work-based assessment in community and public health dietetics. Health Soc Care Commun. 2022;30(6):e5445–56.
24. Lau ST, Ang E, Samarasekera DD, Shorey S. Evaluation of an undergraduate nursing entrustable professional activities framework: An exploratory qualitative research. Nurse Educ Today. 2020;87:104343.
25. Martinez-Pereira Y, McIntyre C, Rhind S. Entrustable professional activities: a framework for assessment in the curriculum and beyond. Pract. 2025;47(1):45–50.
26. Thoma B, Hall AK, Clark K, Meshkat N, Cheung WJ, Desaulniers P, et al. Evaluation of a National Competency-Based Assessment System in Emergency Medicine: A CanDREAM Study. J Graduate Med Educ. 2020;12(4):425–34.
27. Van Der Vleuten CPM. The assessment of professional competence: Developments, research and practical implications. Adv Health Sci Educ. 1996;1(1):41–67.
28. Kotter JP. Leading change. Boston, Massachusetts: Harvard Business Review Press; 1996.
29. Michie S, van Stralen MM, West R. The behaviour change wheel: A new method for characterising and designing behaviour change interventions. Implement Sci. 2011;6(1):42.
30. Vygotsky LS. Interaction between learning and development. In: Cole M, John-Steiner V, Scribner S, Souberman E, editors. Mind and Society. Cambridge Massachusetts: Harvard University Press; 1978. pp. 77–91.
31. Miles M, Huberman AJS. Qualitative data analysis: a methods sourcebook. Los Angeles: Sage; 2014.
32. Obeso V, Grbic D, Emery M, Parekh K, Phillipi C, Swails J, et al. Core Entrustable Professional Activities (EPAs) and the Transition from Medical School to

Residency: the Postgraduate Year One Resident Perspective. Med Sci Educ. 2021;31(6):1813–22.
33. Gofton WT, Dudek NL, Wood TJ, Balaa F, Hamstra SJ. The Ottawa Surgical Competency Operating Room Evaluation (O-SCORE): a tool to assess surgical competence. Acad Med. 2012;87(10):1401–7.
34. MacEwan MJ, DN L, J. WT, and, Gofton WT. Continued Validation of the O-SCORE (Ottawa Surgical Competency Operating Room Evaluation): Use in the Simulated Environment. Teach Learn Med. 2016;28(1):72–9.
35. Dweck CS, Yeager DS, Mindsets. A view from two eras. Perspect Psychol Sci. 2019;14(3):481–96.
36. Shah AP, Walker KA, Hawick L, Walker KG, Cleland J. Scratching beneath the surface: How organisational culture influences curricular reform. Med Educ. 2023;57(7):668–78.
37. Waks L. The Concept of Fundamental Educational Change. Educational Theory. 2007;57:277–95.
38. Hollnagel E, Clay-Williams R. Work-as-Imagined and Work-as-Done. In: Rapport F, Clay-Williams R, Braithwaite J, editors. Implementation Science: The Key Concepts. London: Taylor and Francis; 2022. pp. 175–7.
39. Govaerts M, Van der Vleuten C, Schut S. Implementation of Programmatic Assessment: Challenges and Lessons Learned. Educ Sci. 2022;12:717.
40. Wakhlu A, Meikeljohn S, Bramley A, Johnson C. The education Fellow's role in collaboratively implementing change. Medical Education. 2025;59(10):1135-1136. https://doi.org/10.1111/medu.15712.
41. Phinney LB, Fluet A, O'Brien BC, Seligman L, Hauer KE. Beyond checking boxes: exploring tensions with use of a workplace-based assessment tool for formative assessment in clerkships. Acad Med. 2022;97(10):1511–20.
42. Schut S, Maggio LA, Heeneman S, van Tartwijk J, van der Vleuten C, Driessen E. Where the rubber meets the road — An integrative review of programmatic assessment in health care professions education. Perspect Med Educ. 2021;10(1):6–13.
43. Ryan A, O'Mara D, Tweed M. Evolution or revolution to programmatic assessment: Considering unintended consequences of assessment change. Focus Health Prof Education: Multi-Professional J. 2023;24(2):185–95.
44. Ealing IV, Whereat S, Forsyth R, Hong J, Laurence J. Evaluation of Entrustable Professional Activities Implemented in Australian General Surgical Training: Perspectives of Surgeons and Trainees. J Surg Educ. 2025;82(11):103707.
45. Ginsburg S, Watling CJ, Schumacher DJ, Gingerich A, Hatala R. Numbers encapsulate, words elaborate: toward the best use of comments for assessment and feedback on entrustment ratings. Acad Med. 2021;96(7S):S81–6.
46. Pillai BB, Ip E, James KS, Martin J. Surgical Trainees' Lived Experience of Entrustable Professional Activities: Assessment in the Australasian Context. ANZ J Surg. 2025;95(6):1068–73.
47. Johnson CE, Weerasuria M, Keating J. Effect of face-to-face verbal feedback compared with no or alternative feedback on the objective workplace task performance of health professionals: a systematic review and meta-analysis. BMJ Open. 2020;10(3):e030672.
48. Ramani S, Konings KD, Ginsburg S, van der Vleuten CPM. Twelve tips to promote a feedback culture with a growth mind-set: Swinging the feedback pendulum from recipes to relationships. Med Teach. 2019;41(6):625–31.
49. Johnson CE, Keating J, Molloy E. Psychological safety in feedback: What does it look like and how can educators work with learners to foster it? Med Educ. 2020;54(6):559–70.
50. Johnson C, Keating J, Farlie M, Kent F, Leech M, Molloy E. Educators' behaviours during feedback in authentic clinical practice settings: an observational study and systematic analysis. BMC Med Educ. 2019;19(1):129.
51. Noble C, Billett S, Armit L, Collier L, Hilder J, Sly C, et al. It's yours to take: generating learner feedback literacy in the workplace. Adv health Sci education: theory Pract. 2020;25(1):55–74.
52. Watling CJ, Lingard L. Toward meaningful evaluation of medical trainees: the influence of participants' perceptions of the process. Adv health Sci education: theory Pract. 2012;17(2):183–94.
53. Watling C, Ginsburg S. Assessment, feedback and the alchemy of learning. Med Educ. 2019;53(1):76–85.
54. Lockyer J, Armson H, Könings KD, Lee-Krueger RCW, des Ordons AR, Ramani S, et al. In-the-Moment Feedback and Coaching: Improving R2C2 for a New Context. J Grad Med Educ. 2020;12(1):27–35.
55. Heeneman S, Oudkerk Pool A, Schuwirth LWT, van der Vleuten CPM, Driessen EW. The impact of programmatic assessment on student learning: theory versus practice. Med Educ. 2015;49(5):487–98.
56. Torre D, Lambert S, Cees VdV, Heeneman S. An international study on the implementation of programmatic assessment: Understanding challenges and exploring solutions. Med Teach. 2022;44(8):928–37.
57. Johnson CE, Keating JL, Leech M, Congdon P, Kent F, Farlie MK, et al. Development of the Feedback Quality Instrument: a guide for health professional educators in fostering learner-centred discussions. BMC Med Educ. 2021;21(1):382.
58. Ginsburg S, van der Vleuten C, Eva KW, Lingard L. Hedging to save face: a linguistic analysis of written comments on in-training evaluation reports. Adv Health Sci Educ. 2016;21(1):175–88.
59. Castanelli DJ, Jowsey T, Chen Y, Weller JM. Perceptions of purpose, value, and process of the mini-Clinical Evaluation Exercise in anesthesia training. Can J Anesth. 2016;63(12):1345–56.
60. Schut S, Driessen E, van Tartwijk J, van der Vleuten C, Heeneman S. Stakes in the eye of the beholder: an international study of learners' perceptions within programmatic assessment. Med Educ. 2018;52(6):654–63.
61. Crossley J, Johnson G, Booth J, Wade W. Good questions, good answers: construct alignment improves the performance of workplace-based assessment scales. Med Educ. 2011;45(6):560–9.
62. Gingerich A, Daniels V, Farrell L, Olsen S-R, Kennedy T, Hatala R. Beyond hands-on and hands-off: supervisory approaches and entrustment on the inpatient ward. Med Educ. 2018;52(10):1028–40.
63. Castanelli DJ, Weller JM, Molloy E, Bearman M. Trust, power and learning in workplace-based assessment: The trainee perspective. Med Educ. 2022;56(3):280–91.

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