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Workplace-Based Assessment in Postgraduate Medical Education: A Narrative Review of Tools, Validity, and Educational Impact

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Abstract

Background: Workplace-based assessment (WBA) has become a cornerstone of competency-based medical education, shifting evaluation from artificial testing environments to authentic clinical settings. Tools such as Direct Observation of Procedural Skills (DOPS), Mini-Clinical Evaluation Exercise (mini-CEX), and Case-Based Discussion (CbD) are widely used to assess clinical competence in real time, yet a comprehensive synthesis of their validity, reliability, and educational impact is needed. **Objectives:** This narrative review aims to evaluate the effectiveness of WBA tools in postgraduate medical education, with a focus on their psychometric properties, feasibility, and role in enhancing clinical skills and professional development. **Methods:** A narrative review methodology was employed, guided by established frameworks for medical education research. Electronic databases, including PubMed, PMC, and Google Scholar, were searched using terms such as “workplace-based assessment,” “DOPS,” “mini-CEX,” and “postgraduate medical education.” Inclusion criteria encompassed peer-reviewed studies, reviews, and guidelines published in English that discussed the design, implementation, or outcomes of WBA tools. Thematic synthesis was used to analyse and integrate findings. **Results:** Evidence indicates that WBA tools significantly improve procedural and clinical competencies through structured observation and immediate feedback. DOPS demonstrated marked skill progression, with mean scores increasing from 3.91 to 7.25 in suturing ($p < 0.001$). Reliability improves with aggregation. DOPS achieves a generalisability coefficient of 0.75, reaching 0.80 after six assessments. WBA is feasible, with DOPS taking approximately 24 minutes (11 min observation, 13 min feedback). Trainees report high acceptability, citing enhanced confidence and skill mastery. **Conclusions:** WBA is a valid, reliable, and educationally valuable approach when implemented longitudinally and supported by rater training and institutional commitment. It plays a critical role in shaping competent, reflective practitioners within modern medical education frameworks. Future efforts should focus on standardisation, digital integration, and faculty development to maximise its impact. **Keywords:** workplace-based assessment, postgraduate medical education, Tools, Validity, Educational Impact.

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Introduction:

Workplace-based assessment (WBA) has emerged as a cornerstone of competency-based medical education (CBME), shifting the evaluation of clinical competence from artificial testing environments to authentic clinical settings¹. Unlike traditional summative assessments, WBA embeds direct observation of trainees into routine clinical practice, thereby enhancing ecological validity and supporting formative, feedback-driven learning^{2,3}. This approach fosters reflective practice and continuous professional development—attributes essential for contemporary postgraduate medical training^{4,5}.

Conventional assessment modalities, such as multiple-choice questions and objective structured clinical examinations (OSCEs), often fail to capture the complexity, contextual variability, and interpersonal nuances of real patient care^{6,7}. In response, workplace-based tools—including Direct Observation of Procedural Skills (DOPS), the Mini-Clinical Evaluation Exercise (mini-CEX), and Case-Based Discussion (CbD)—offer a more comprehensive evaluation of technical proficiency, communication, professionalism, and clinical reasoning within real clinical contexts^{8,9}. These tools align closely with Miller's pyramid of clinical competence by assessing the highest level of performance: what the learner "does" in practice⁹.

WBA is firmly grounded in the principles of workplace-based learning, which recognise that meaningful professional development occurs through supervised participation in authentic clinical activities¹⁰. Embedding assessment within daily clinical workflows not only evaluates competence but also actively promotes learning through structured feedback and

guided reflection¹¹. Despite persistent challenges related to standardisation, rater reliability, and assessor variability, a growing body of evidence supports the educational value, acceptability, and feasibility of WBA in postgraduate training¹².

However, existing literature remains fragmented, with variable reports on psychometric properties, implementation strategies, and educational outcomes across different specialties and settings. A comprehensive synthesis of the validity, reliability, feasibility, and educational impact of core WBA tools is notably lacking.

Objectives of this review

This narrative review aims to synthesise current evidence on workplace-based assessment in postgraduate medical education, with particular emphasis on:

- 1) The validity and reliability of commonly used WBA tools (DOPS, mini-CEX, CbD, MSF, and EPAs);
- 2) The feasibility of integrating these tools into busy clinical environments, and
- 3) Their educational impact on clinical competence, learner engagement, and professional development.

Methods

This narrative review was conducted to synthesise current evidence on workplace-based assessment (WBA) in postgraduate medical education, focusing on the validity, feasibility, and educational impact of core assessment tools such as Direct Observation of Procedural Skills (DOPS), Mini-Clinical Evaluation Exercise (mini-CEX), and Case-Based Discussion (CbD). The review followed established methodological guidance for narrative reviews in medical education^{1,2}.

Search strategy

A comprehensive literature search was undertaken using electronic databases including PubMed, PubMed Central (PMC), and Google Scholar. No restrictions were placed on the year of publication to ensure inclusion of both foundational literature and recent developments. Search terms included combinations of "workplace-based assessment," "postgraduate medical education," "clinical competence," "DOPS," "mini-CEX," "case-based discussion," "formative assessment," and "narrative review." The search strategy was refined iteratively based on relevance and scope³. Reference lists of key articles were manually searched to identify additional relevant studies⁴.

Inclusion and exclusion criteria

Inclusion criteria comprised peer-reviewed original research articles, systematic and

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narrative reviews, and professional guidelines published in English that addressed the design, implementation, validity, reliability, or educational outcomes of WBA in postgraduate medical education. Studies focusing exclusively on undergraduate education, non-clinical assessments, or lacking sufficient methodological detail were excluded.

Study selection and synthesis

Consistent with the narrative review methodology, study selection and synthesis were interpretive, prioritising literature offering empirical evidence or conceptual clarity regarding WBA practices⁵. Data were extracted and organised thematically around the key constructs of validity, reliability, feasibility, educational impact, and learner acceptability. The synthesis employed a thematic analysis approach, grouping findings into recurring themes and patterns across the included literature^{6,7}.

Table 1: Comparison of Common WBA Tools

Author & Year	Tool	Purpose	Assessment Focus	Feedback Type	Dur ation	Key Strengths
Prakash et al. (2020) ¹	DO PS	Procedural skill evaluation	Technical competence, safety, communication	Immediate, structured	10-15 min	Real-time observation, skill-specific feedback
Norcini & Burch (2007) ²	mini-CEX	Clinical encounter assessment	History taking, physical exam, professionalism	Immediate, narrative	15-20 min	Holistic patient interaction evaluation
Singh & Modi (2013) ⁷	CbD	Case management review	Clinical reasoning,	Delayed, reflective	20-30 min	Encourages reflection on complex cases

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Author & Year	Tool	Purpose	Assessment Focus	Feedback Type	Duration	Key Strengths
			decision-making			
Govaerts et al. (2012) ²⁰	MSF	Professional behavior assessment	Teamwork, communication, ethics	Anonymized, aggregated	Periodic	Captures multi-source perspectives
So et al. (2024) ²⁴	EPA	Entrustment decision	Readiness for unsupervised practice	Summative, competency-based	Variable	Links assessment to clinical responsibility

Table 2: Psychometric Properties of WBA Tools

Author & Year	Tool	Reliability (G-coefficient)	Validity Evidence	No. of Assessments for 0.80 Reliability	Feasibility (Time per Assessment)
Govaerts et al. (2012) ²⁰	DOPS	0.75	Strong content and construct validity	6	11 min + 13 min feedback
Moonen-van Loon et al. (2013) ²¹	mini-CEX	0.78	High face and content validity	5	15–20 min
Moonen-van Loon et al. (2013) ²¹	CbD	0.68	Moderate construct validity	8	20–30 min
Moonen-van Loon et al. (2013) ²¹	MSF	0.82	Strong criterion validity	4	Periodic (quarterly)

Results 3: Validity and Reliability of WBA Tools

Author & Year	WBA Tool	Reliability Coefficient (G-coefficient)	Number of Assessments for 0.80 Reliability	Validity Evidence	Key Limitations
Prakash et al. (2020) ¹	DOPS	0.75	6	Strong content and construct validity; aligns with real-world procedural performance	Moderate inter-rater reliability; requires rater training to reduce subjectivity
Govaerts et al. (2012) ²⁰	mini-CEX	0.78	5	High face, content, and construct validity; validated across specialties	Feedback quality varies with rater experience; potential for leniency bias
Moonen-van Loon et al. (2013) ²¹	CbD	0.68	8	Supports reflective practice; moderate construct validity	Lower reliability; dependent on case complexity and rater expertise
Moonen-van Loon et al. (2013) ²¹	MSF	0.82	4	Strong criterion and content validity; captures multi-source perspectives	Requires large sample of raters; risk of non-specific feedback
So et al. (2024) ²⁴	EPA	0.79	5–6	High validity for entrustment decisions; integrates multiple WBA data points	Dependent on quality of underlying assessments; cultural resistance in some settings

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Table 4: Educational Impact and Feasibility of WBA Tools

Author & Year	WBA Tool	Educational Impact	Feasibility (Time per Assessment)	Learner Acceptability	Faculty Feedback	Key Supporting Evidence
Prakash et al. (2020) ¹	DOPS	Significantly improves procedural skill acquisition; enhances feedback quality and self-confidence; promotes patient safety	11 min assessment + 13 min feedback = 24 min total	High; learners report improved skill mastery and confidence	Positive; faculty find it structured and effective for formative assessment	$p < 0.001$ improvement in skills; repeated DOPS enhances quality of clinical skills
Norcini & Burch (2007) ²	mini-CEX	Enhances clinical reasoning, communication, and professionalism through real-time observation and feedback	15–20 minutes per encounter	High; valued for holistic feedback on patient interactions	Generally positive; some report time burden and variability in case complexity	Supports workplace-based learning principles; strong educational value in formative learning.
Norcini & Burch (2007) ²	CbD	Promotes reflective practice and clinical decision-making; improves case management skills	20–30 minutes per session	Moderate to high; dependent on quality and timeliness of feedback	Mixed; some find it time-consuming and challenging to standardize	Encourages reflection; useful for assessing higher-order thinking
Govaerts et al. (2012) ²⁰	MSF	Enhances awareness of	Periodic (e.g., quarterly);	High; trainees value	Positive for summative	Supports longitudinal performance

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Author & Year	WBA Tool	Education al Impact	Feasibility (Time per Assessment)	Learner Acceptability	Faculty Feedback	Key Supporting Evidence
So et al. (2024) ²⁴	EPA	professional behavior; improves teamwork and communication skills through multi-source input	no per-encounter time	diverse perspectives	ive decisions; concerns about anonymity and feedback specificity	tracking; strengthens professional development
		Facilitates entrustment decisions; integrates multiple WBA data points for competency-based progression	Variable; based on cumulative assessment data	High; aligns with clinical responsibility and autonomy	Positive in structured programs; requires cultural shift in supervision	Supports competency-based education; enables tailored supervision.

Table 5: Thematic Synthesis of WBA Outcomes

Author & Year	Theme	Description	Supporting Evidence	Key Implications
Prakash et al. (2020) ¹	Enhancement of Clinical Skills	WBA tools, particularly DOPS, significantly improve procedural and clinical competencies through structured observation and immediate feedback. Repeated assessments lead	DOPS scores increased from 3.91 to 7.25 in suturing ($p < 0.001$); similar gains in catheterization, lumbar puncture, and central line insertion [1,22]. Trainees report improved confidence and technical mastery.	Regular use of DOPS fosters skill acquisition and patient safety; supports formative learning in postgraduate training [26,27].

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Author & Year	Theme	Description	Supporting Evidence	Key Implications
Norcini & Burch (2007) ²	Educational Value and Acceptability	to measurable skill progression. Trainees and faculty perceive WBA as educationally valuable, promoting reflective practice, communication, and professionalism. Acceptability is high when feedback is constructive and learner-centred.	85% of trainees reported improved learning; 78% of faculty found DOPS useful for formative assessment. Narrative feedback enhances self-awareness	WBA strengthens the educational alliance; learner choice in procedure and assessor increases engagement.
Veloski et al. (2006) ³	Educational Value and Acceptability	Narrative feedback provided through WBA enhances self-awareness and promotes reflective learning.	Narrative feedback has been shown to improve clinical performance and professional development.	Structured feedback should be prioritized over simple scores to maximize educational impact.
Young et al. (2020) ⁸	Challenges in Implementation	Barriers include time constraints, rater variability, inconsistent feedback, and cultural resistance. Use for summative decisions remains limited due to psychometric concerns.	Only 40–60% of planned assessments are completed in some programs [8]; concerns about fairness in high-stakes decisions persist.	Requires faculty development, standardised training, and organisational commitment for sustainable integration.
Wilkinson et al. (2008) ¹³	Feasibility in Clinical Workflow	Most WBA tools are time-efficient and can be integrated into routine practice.	Studies report high feasibility in emergency, surgical, and internal medicine	Institutional support and protected time improve implementation; brief, structured

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Author & Year	Theme	Description	Supporting Evidence	Key Implications
		DOPS takes ~24 minutes (11 min assessment + 13 min feedback), while mini-CEX and CbD require 15–30 minutes.	settings. Digital tools further enhance efficiency.	formats increase assessor engagement.
Govaerts et al. (2012) ²⁰	Reliability Through Aggregation	Individual WBA assessments show variable reliability, but composite scores from multiple encounters achieve acceptable generalisability (G-coefficient ≥ 0.80). Rater training and standardisation enhance consistency.	DOPS requires 6 assessments for 0.80 reliability (G = 0.75); mini-CEX requires 5 (G = 0.78); MSF achieves it in 4 (G = 0.82) [1,20,21]. Rater idiosyncrasy remains a challenge without training	WBA should be used longitudinally; portfolios combining multiple assessments are more reliable than single events.
Moonen-van Loon et al. (2013) ²¹	Reliability Through Aggregation	Aggregation of multiple assessments across different raters and occasions improves the generalisability of WBA scores.	MSF achieves a G-coefficient of 0.82 with 4 assessments	Multiple assessors and occasions are necessary for reliable summative decisions.
Kamat et al. (2022) ²²	Enhancement of Clinical Skills	Repeated DOPS assessments lead to statistically significant improvements in procedural skills.	DOPS scores increased from 3.91 to 7.25 in suturing (p < 0.001)	Regular, repeated WBA is essential for skill mastery.
Wanjari & Rawekar (2019) ²³	Enhancement of Clinical Skills	Trainees report improved confidence and technical mastery	Students perceived DOPS as beneficial for skill acquisition	Learner confidence is enhanced through structured

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Author & Year	Theme	Description	Supporting Evidence	Key Implications
		following repeated DOPS assessments.	and self-confidence	observation and feedback.
So et al. (2024) ²⁴	Feasibility in Clinical Workflow	Digital platforms and electronic portfolios enhance the efficiency and accessibility of WBA.	Digital tools streamline documentation, feedback, and data aggregation	Integration of digital solutions can reduce administrative burden and improve compliance.
Hauer et al. (2015) ²⁵	Entrustment Decisions	EPA frameworks integrate multiple WBA data points to inform entrustment decisions and clinical supervision levels.	Entrustment decisions require longitudinal assessment data and faculty judgement	WBA data should be linked to entrustment scales for competency-based progression.
Ahmad et al. (2024) ²⁶	Enhancement of Clinical Skills	DOPS is effective in enhancing clinical competencies in postgraduate medical and dental education.	Scoping review evidence supports DOPS for formative skill development	DOPS should be embedded as a routine formative assessment tool.
Ahmad et al. (2024) ²⁷	Enhancement of Clinical Skills	DOPS improves clinical competency in specialised areas such as oral implantology.	Postgraduate trainees demonstrate skill progression with repeated DOPS	Specialty-specific WBA tools enhance targeted skill development.

Discussion

Workplace-based assessment represents a paradigm shift in postgraduate medical education, moving from decontextualised testing toward authentic evaluation of clinical performance in real-world practice¹. Unlike traditional summative assessments, WBA embeds direct observation of trainees into routine clinical practice, thereby enhancing ecological

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validity and supporting formative, feedback-driven learning^{2,3}. This approach fosters reflective practice and continuous professional development—attributes essential for contemporary postgraduate medical training^{4,5}.

Conventional assessment modalities, such as multiple-choice questions and objective structured clinical examinations (OSCEs), often fail to capture the complexity,

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contextual variability, and interpersonal nuances of real patient care^{6,7}. In response, workplace-based tools—including Direct Observation of Procedural Skills (DOPS), the Mini-Clinical Evaluation Exercise (mini-CEX), and Case-Based Discussion (CbD)—offer a more comprehensive evaluation of technical proficiency, communication, professionalism, and clinical reasoning within real clinical contexts^{8,9}. These tools align closely with Miller's pyramid of clinical competence by assessing the highest level of performance: what the learner "does" in practice⁹.

WBA is firmly grounded in the principles of workplace-based learning, which recognise that meaningful professional development occurs through supervised participation in authentic clinical activities¹⁰. Embedding assessment within daily clinical workflows not only evaluates competence but also actively promotes learning through structured feedback and guided reflection¹¹. Despite persistent challenges related to standardisation, rater reliability, and assessor variability, a growing body of evidence supports the educational value, acceptability, and feasibility of WBA in postgraduate training¹².

The successful implementation of WBA requires institutional commitment and faculty development. Studies have demonstrated that rater training significantly improves the quality and consistency of assessments^{13,14}. Furthermore, the use of structured assessment forms and standardised criteria enhances inter-rater reliability and reduces subjectivity [15,16]. Thematic analysis of qualitative feedback from trainees and faculty has identified key facilitators and barriers to WBA adoption^{17,18}.

Case-based discussion (CbD) serves as a valuable tool for assessing clinical reasoning and decision-making skills¹⁹. When integrated with other WBA tools,

CbD provides a comprehensive picture of trainee competence. Research by Govaerts and colleagues has highlighted the importance of broad perspectives in clinical performance assessment, emphasising that multiple assessors and varied clinical contexts contribute to more reliable judgements²⁰. Similarly, Moonen-van Loon and associates demonstrated that multisource feedback achieves acceptable generalisability when sufficient assessments are aggregated²¹.

The educational impact of WBA has been well documented. Kamat and colleagues reported statistically significant improvements in procedural skills following repeated DOPS assessments, with suturing scores increasing from 3.91 to 7.25 ($p < 0.001$)²². Wanjari and Rawekar found that trainees perceive WBA as highly beneficial for skill acquisition and self-confidence, with 85% of learners reporting improved clinical competence following structured feedback²³. Digital innovations have further enhanced the feasibility and accessibility of WBA, with electronic platforms streamlining documentation and feedback processes²⁴.

Entrustable Professional Activities (EPAs) represent an advanced application of WBA, linking multiple assessment data points to decisions about clinical supervision and autonomy. Hauer and colleagues emphasised that entrustment decisions require longitudinal assessment data and faculty judgement, integrating information from DOPS, mini-CEX, CbD, and MSF²⁵. Recent scoping reviews have confirmed that DOPS is effective in enhancing clinical competencies across postgraduate medical and dental education²⁶. Speciality-specific applications, such as in oral implantology, demonstrate that repeated DOPS assessments lead to measurable skill progression and improved patient safety outcomes²⁷.

WBA represents a valid, reliable, and educationally valuable approach to postgraduate medical assessment. When implemented longitudinally with adequate rater training, institutional support, and digital infrastructure, WBA plays a critical role in shaping competent, reflective, and patient-centred practitioners.

Conclusion

Workplace-based assessment (WBA) has established itself as a cornerstone of modern postgraduate medical education, providing authentic, real-time evaluation of clinical competence in actual practice settings. The evidence synthesized in this review demonstrates that tools such as Direct Observation of Procedural Skills (DOPS), the Mini-Clinical Evaluation Exercise (mini-CEX), and Case-Based Discussion (CbD) enable structured observation and immediate feedback, thereby enhancing skill acquisition, professionalism, and reflective practice among postgraduate trainees.

The key findings of this review confirm that WBA tools demonstrate acceptable validity and reliability when implemented longitudinally, with generalisability coefficients reaching 0.80 after

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approximately five to six assessments per tool. The feasibility of WBA has been confirmed across multiple specialties, with DOPS requiring approximately 24 minutes per encounter and mini-CEX requiring 15 to 20 minutes. The educational impact of WBA is substantial, with trainees reporting improved confidence, skill mastery, and clinical reasoning following structured feedback. Challenges related to rater variability, time constraints, and cultural resistance persist but can be addressed through faculty development, digital integration, and institutional commitment. WBA is a valid, feasible, and educationally valuable approach that plays a critical role in shaping competent, reflective, and patient-centred practitioners within competency-based training frameworks. Its continued refinement, standardisation, and implementation are essential for high-quality postgraduate medical education. Future efforts should focus on standardisation of assessment criteria, digital integration through electronic portfolios, faculty development programmes, longitudinal implementation with adequate protected time, and linking WBA data to entrustment decisions for competency-based progression.

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Comments of Reviewer

Referencing is vital part of a review. I have tried to correct most of them except following:

- i) Author shall make serial appearance of the references. It is not maintained for referring the Tables.
- ii) Author shall recheck the correctness of references of serials 20 to 25 and 27 before final selection.
After correction this may be considered for publication