Comparing the Ottawa Emergency Department Shift Observation Tool (O-EDShOT) to the traditional daily encounter card: measuring the quality of documented assessments

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Abstract

Objectives The Ottawa Emergency Department Shift Observation Tool (O-EDShOT) is a workplace-based assessment designed to assess a trainee's performance across an entire shift. It was developed in response to validity concerns with traditional end-of-shift workplace-based assessments, such as the daily encounter card. The O-EDShOT previously demonstrated strong psychometric characteristics; however, it remains unknown whether the O-EDShOT facilitates measurable improvements in the quality of documented assessments compared to daily encounter cards.

Methods Three randomly selected daily encounter cards and three O-EDShOTs completed by 24 faculty were scored by two raters using the Completed Clinical Evaluation Report Rating (CCERR), a previously published 9-item quantitative measure of the quality of a completed workplace-based assessment. Automated-CCERR (A-CCERR) scores, which do not require raters, were also calculated. Paired sample *t* tests were conducted to compare the quality of assessments between O-EDShOTs and DECAs as measured by the CCERR and A-CCERR.

Results CCERR scores were significantly higher for O-EDShOTs (mean(SD) = 25.6(2.6)) compared to daily encounter cards (21.5(3.9); $t(23) = 5.2$, $p < 0.001$, $d = 1.1$). A-CCERR scores were also significantly higher for O-EDShOTs (mean(SD) = 18.5(1.6)) than for daily encounter cards (15.5(1.2); $t(24) = 8.4$, $p < 0.001$). CCERR items 1, 4 and 9 were rated significantly higher for O-EDShOTs compared to daily encounter cards.

Conclusions The O-EDShOT yields higher quality documented assessments when compared to the traditional end-of-shift daily encounter card. Our results provide additional validity evidence for the O-EDShOT as an assessment tool for capturing trainee on-shift performance that can be used as a stimulus for actionable feedback and as a source for high-quality workplace-based assessment data to inform decisions about emergency medicine trainee progress and promotion.

Keywords Emergency medicine · Trainee assessment · Assessment quality · Entrustability scales

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Résumé

Objectifs L'outil d'observation des quarts de travail des services d'urgence d'Ottawa (O-EDShOT) est une évaluation en milieu de travail conçue pour évaluer la performance d'un stagiaire pendant tout un quart de travail. Il a été développé en réponse à des problèmes de validité avec les évaluations traditionnelles en milieu de travail de fin de quart de travail, comme la fiche de rencontre quotidienne (DEC). Le O-EDShOT avait préalablement démontré de fortes caractéristiques psychométriques; cependant, on ignore toujours si l'O-EDShOT facilite des améliorations mesurables de la qualité des évaluations documentées par rapport aux fiches de rencontre quotidiennes.

Méthodes Trois fiches de rencontre quotidiennes sélectionnées au hasard et trois O-EDShOT complétés par 24 membres du corps professoral ont été marqués par deux évaluateurs à l'aide de Completed Clinical Evaluation Report Rating (CCERR), une mesure quantitative en 9 points publiée précédemment de la qualité d'une évaluation en milieu de travail réalisée. Les scores du CCERR automatisé (A-CCERR), qui ne nécessitent pas d'évaluateur, ont également été calculés. Des tests t d'échantillons appariés ont été effectués pour comparer la qualité des évaluations entre les O-EDShOT et les DEC, telle que mesurée par le CCERR et l'A-CCERR.

Résultats Les scores CCERR étaient significativement plus élevés pour les O-EDShOT (moyenne (ET) = 25,6 (2,6)) par rapport aux fiches de rencontre quotidiennes (21,5 (3,9) ; $t(23) = 5,2$, $p < 0,001$, $d = 1,1$). Les scores A-CCERR étaient également significativement plus élevés pour les O-EDShOT (moyenne (ET) = 18,5 (1,6)) que pour les fiches de rencontre quotidiennes (15,5 (1,2) ; $t(24) = 8,4$, $p < 0,001$). Les points 1, 4 et 9 du CCERR ont été notés beaucoup plus haut pour les O-EDShOT que pour les fiches de rencontre quotidiennes.

Conclusions L'O-EDShOT produit des évaluations documentées de meilleure qualité par rapport à la traditionnelle fiche de rencontre quotidienne de fin de quart de travail. Nos résultats fournissent des preuves de validité supplémentaires pour l'O-EDShOT en tant qu'outil d'évaluation pour saisir les performances des stagiaires en poste qui peuvent être utilisés comme stimulus pour une rétroaction exploitable, et comme source de données d'évaluation de haute qualité en milieu de travail pour notifier les décisions sur la progression et promotion des stagiaires en médecine d'urgence.

Clinician's capsule

What is known about the topic?

The Ottawa Emergency Department Shift Observation Tool (O-EDShOT) is a workplace-based assessment that has previously demonstrated strong psychometric characteristics.

What did this study ask?

Whether the O-EDShOT facilitates measurable improvements in the quality of documented assessments compared to the traditional daily encounter card.

What did this study find?

O-EDShOTs yield higher quality documented assessments compared to traditional daily encounter cards as measured by the Completed Clinical Evaluation Report Rating (CCERR).

Why does this study matter to clinicians?

The O-EDShOT has value for providing quality assessment information that drives actionable feedback and informs high-stakes decisions about trainee progress/promotion.

by 2022, workplace-based assessments are being increasingly incorporated into systems of assessment [1]. A common form of workplace-based assessment in the emergency department (ED) is the end-of-shift assessment, traditionally in the form of a daily encounter card, which is intended to capture the performance of a trainee during a shift [2]. Daily encounter cards facilitate the simultaneous assessment of multiple competencies during an ED shift [2–4] and are designed to capture expert judgement of a trainee's performance after a brief supervisor-trainee interaction, thus minimizing recall bias [2–7].

Despite these benefits, evidence suggests that the quality of assessments documented on daily encounter cards are poor [2]. Bandiera and Lendrum [8] found that daily encounter cards were subject to leniency or range restriction effects wherein supervisors provided “inflated” or overly favourable assessments leading to indiscriminate ratings. Sherbino et al. [6] found that daily encounter card items were not well understood by front-line supervisors, resulting in poor reliability and questionable validity of the scores. While many other assessment tools have been developed to assess performance during an ED shift, a systematic review of the literature demonstrated a paucity of validity evidence for most of these workplace-based assessments [9]. In response, the Ottawa Emergency Department Shift Observation Tool (O-EDShOT) was developed (see online Supplemental Appendix A) [5].

The O-EDShOT is an outcomes-oriented workplace-based assessment designed to assess a trainee's ability to

Introduction

With the transition to competency-based medical education occurring for all post-graduate medical education programs

effectively manage an ED shift—a defining attribute of any emergency physician and a key outcome of residency training [5, 10, 11]. The O-EDShOT uses a rating scale that incorporates entrustment anchors that have been shown to produce more reliable ratings of performance compared to traditional anchors [5, 12–16]. Previous studies have demonstrated that the O-EDShOT is able to discriminate performance abilities between training levels and provide a reliable measure of a trainee’s ability to safely run an ED shift independently. Further, preceptors and trainees perceive the O-EDShOT to be more feasible, practical, and time efficient compared to the traditional daily encounter card [5]. What remains unknown is whether the O-EDShOT provides measurable improvements in the quality of documented assessments compared to the traditional daily encounter card.

Methods

Study design and time period

This retrospective study compared the quality of documented assessments between the daily encounter card and the O-EDShOT as measured by the Completed Clinical Evaluation Report Rating (CCERR) [2, 17–21]. Daily encounter cards included in this study were completed by clinical supervisors for trainees between December 2017–May 2018 (see online Supplemental Appendix B). O-EDShOTs included were completed from July–December 2018. This study received full ethics review exemption from the Ottawa Health Science Network Research Ethics Board.

Study setting and population

This study was conducted in the Department of Emergency Medicine at the University of Ottawa, which is comprised of two tertiary care campuses of The Ottawa Hospital. Daily encounter cards and O-EDShOTs completed by clinical supervisors for trainees in the Royal College of Physicians and Surgeons of Canada Emergency Medicine (RCPSC-EM) residency program during the study period were included. The majority of faculty development in preparation for the transition to competency-based medical education occurred prior to December 2017.

Measure of assessment quality

Between January–April 2020, the CCERR was used to determine the quality of assessments documented on daily encounter cards and O-EDShOTs [2, 17]. The CCERR is a nine-item instrument designed to provide a quantitative measure of the quality of completion of an in-training evaluation report [17]. Validity evidence for CCERR scores has

recently been demonstrated for end-of-shift workplace-based assessments, including high reliability and the ability to discriminate workplace-based assessments of varying quality [2, 7, 20]. Use of the CCERR does not require raters to undertake any training other than reading the instructions [17–20]. Raters in this study could not be blinded to the type of assessment (daily encounter card vs O-EDShOT) as the forms are visibly different. Therefore, the quality of daily encounter card and O-EDShOT completion was also measured using the Automated-CCERR (A-CCERR). The A-CCERR is a less resource-intensive tool that does not require raters, thus obviating the need for blinding. It provides a reliable measure of the quality of documented assessments based on word count, variability in ratings, and the proportion of comment boxes completed on the form [21].

Sample size and procedures

Based on prior studies, we estimated that 24 faculty supervisors were required to detect a 3-point difference in mean CCERR scores to achieve a power of 80% and a significance level of 5% (two-tailed), assuming a standard deviation of 6.21 [2, 17]. For each of the 24 faculty supervisors, six assessment forms (3 daily encounter cards and 3 O-EDShOTs) were sufficient to ensure a reliability of 0.80 (95% confidence interval 0.75–0.84). Prior research has identified high levels of interrater reliability using the CCERR, and as such, two faculty raters scored each daily encounter card and O-EDShOT [2, 17, 21].

Daily encounter cards and O-EDShOTs were collected from the Department of Emergency Medicine electronic database by a research assistant. Based on the sample size calculation above, three daily encounter cards and three O-EDShOTs completed by 24 different faculty supervisors were randomly selected using a random number generator [22]. There was a similar proportion of residents at each training level (PGY1–5) in our sample of daily encounter cards and O-EDShOTs. All 144 assessment forms, 72 daily encounter cards and 72 O-EDShOTs, were further deidentified by a research assistant. Subsequently, two faculty raters scored each deidentified daily encounter card and O-EDShOT using the CCERR. CCERR scores were calculated by summing the scores for the 9 individual CCERR items. A-CCERR scores were calculated using the previously published formula: $\log_{10}(\text{word count}) + 0.028(\text{variability in ratings}) + 0.069(\text{proportion of comments completed})$ [21]. This provided for “blinded scores” as no raters are required for the A-CCERR.

Data analysis

Data analysis was conducted using IBM SPSS Statistics for Windows Version 26.0 (IBM Corp., Armonk, NY, USA).

For each faculty member, mean faculty CCERR scores were calculated by collapsing across the three assessments for both daily encounter card and O-EDShOT forms. As a measure of homogeneity, item-total correlations (ITCs) were calculated for each CCERR item across the two assessment forms. Interrater reliability for the daily encounter card and O-EDShOT were then calculated using intraclass correlation coefficient (ICC) based on a two-way mixed-effects single-measure model [23].

We interpreted ICCs < 0.50 to be indicative of poor interrater reliability, values between 0.50 and 0.75 to indicate moderate interrater reliability, values between 0.75 and 0.90 to indicate good interrater reliability, and values > 0.90 to indicate excellent interrater reliability [24]. To examine the internal consistency of CCERR items for daily encounter cards and O-EDShOTs, mean CCERR item ratings were calculated by collapsing across the two raters. These values were used to calculate descriptive statistics for the daily encounter card and O-EDShOT, including means, standard deviations, and item total correlations. Cronbach's alpha was then calculated for both the daily encounter card and O-EDShOT to investigate the internal consistency of CCERR items across the two workplace-based assessment forms. Generally speaking, acceptable values of alpha range from 0.70 to 0.95, with $\alpha > 0.90$ typically demonstrating excellent internal consistency [24].

To compare the quality of documented assessments on the two workplace-based assessment forms, paired sample *t* tests were used to determine whether mean CCERR scores, collapsed across raters, differed between daily encounter cards and O-EDShOTs. The analysis was repeated with A-CCERR scores to determine if lack of blinding influenced

the results. Data were tested for normality using the Shapiro–Wilk test. To determine whether there were any differences between CCERR item ratings across the two assessment forms, we conducted a repeated-measures analysis of variance (ANOVA), using the mean CCERR scores as the dependent variable and workplace-based assessment form (2 levels: daily encounter card vs. O-EDShOT) and mean CCERR item rating (9 levels: 9 CCERR items) as independent variables. Bonferroni corrections were applied to all multiple pairwise comparisons. Effect sizes were calculated using partial eta-squared (η^2) for ANOVAs and Cohen *d* for *t* tests. The magnitude of these effect sizes was interpreted using classifications proposed by Cohen: small effect sizes $\approx \eta^2 < 0.02$ and Cohen $d < 0.2$; medium effect sizes $\approx 0.02 < \eta^2 < 0.13$, and $0.2 < d < 0.8$; and large effect sizes $\approx \eta^2 > 0.14$ and $d > 0.8$ [23].

Results

There was good interrater reliability for mean CCERR scores between the two raters for both the daily encounter card (ICC (95% confidence interval) = 0.85 (0.69–0.93)) and moderate interrater reliability for the O-EDShOT (0.74 (0.48–0.88)). Cronbach's alpha revealed high internal consistency of CCERR items for both the daily encounter card and the O-EDShOT ($\alpha = 0.90$ and 0.81 , respectively). CCERR scores were normally distributed for both assessment forms (Shapiro–Wilk for daily encounter card: $W(24) = 0.98$, $p = 0.92$; for O-EDShOT: $W(24) = 0.95$, $p = 0.27$). Mean CCERR scores were significantly higher for the O-EDShOT (mean(SD) = 25.6(2.6)) compared to

Table 1 Mean (SD) and item total correlations (ITC) for CCERR items across daily encounter card and O-EDShOT assessment forms

CCERR item	DEC		O-EDShOT	
	Mean (SD)	ITC	Mean (SD)	ITC
1. Checklist/numeric ratings show sufficient variability to allow identification of relative strengths and weaknesses of the trainee ^a	2.3 (0.7)	0.6	3.0 (0.3)	0.3
2. Comments are balanced providing both strengths and areas for improvement	2.7 (0.5)	0.8	2.9 (0.4)	0.8
3. The trainee's response to feedback and/or remediation during the shift or rotation is described in the comments	1.1 (0.2)	0.5	1.0 (0.2)	0.3
4. Comments justify the ratings provided ^a	2.3 (0.4)	0.7	2.9 (0.4)	0.7
5. Clearly explained examples of strengths using specific descriptions (not generalizations) are provided in the comments	2.5 (0.7)	0.7	2.9 (0.8)	0.5
6. Clearly explained examples of weaknesses using specific descriptions (not generalizations) are provided in the comments	2.2 (0.7)	0.8	2.6 (0.6)	0.5
7. Concrete recommendations for the trainee to attain a higher level of performance are provided	2.6 (0.6)	0.8	2.9 (0.6)	0.7
8. Comments are provided in a supportive manner	2.9 (0.2)	0.6	3.1 (0.2)	0.5
9. Overall, this assessment provides enough detail for an independent reviewer to clearly understand the trainee's performance on the shift ^a	2.6 (0.5)	0.8	3.2 (0.3)	0.7

DEC daily encounter card

^aDenotes significantly higher ($p < 0.05$) scores for CCERR items 1, 4 and 9 for the O-EDShOT as compared to the daily encounter card

the daily encounter card (21.5(3.9); $t(23)=5.2$, $p<0.001$, $d=1.1$). Similarly, A-CCERR scores were significantly higher for the O-EDShOT (mean(SD)=18.5(1.6)) compared with the daily encounter card (15.5(1.2); $t(23)=8.4$, $p<0.001$, Cohen's $d=1.7$).

Table 1 displays mean (SD) and ITCs for CCERR items. The repeated measures ANOVA demonstrated a significant interaction between workplace-based assessment form and CCERR item, suggesting that the differences between the two assessment forms varied across the individual CCERR items ($F(8,184)=6.40$, $p<0.001$, $\eta^2=0.218$). After correcting for multiple comparisons, ratings for item 1 ($t(23)=4.8$, $p_{\text{bonferroni}}<0.001$, $d=0.99$), item 4 ($t(23)=6.7$, $p_{\text{bonferroni}}<0.001$, $d=1.36$) and item 9 ($t(23)=6.2$, $p_{\text{bonferroni}}<0.001$, $d=1.27$) were found to be significantly higher for the O-EDShOT compared to the daily encounter card.

Discussion

Interpretation of findings

Our results suggest that faculty provide higher quality documented assessments when using the O-EDShOT compared with the daily encounter card. In competency-based medical education, programs rely heavily on data gathered through workplace-based assessments, and high-quality data is necessary to provide formative feedback and make important decisions about trainee advancement. Previous research on the O-EDShOT has demonstrated its strong psychometric properties; however, this is the first study to demonstrate that the O-EDShOT facilitates higher-quality assessments, which has pragmatic value for driving actionable feedback and for high-stakes decisions about trainee progress and promotion [5, 14, 25]. Our results contribute additional validity evidence for the O-EDShOT at the implications inference stage of Kane's validity framework [26].

Specific factors driving these findings

Results demonstrated that CCERR items 1, 4 and 9 were rated significantly higher for the O-EDShOT compared to the daily encounter card. These differences likely contributed to the O-EDShOT's overall higher quality. The observed ratings on item 1 ("Checklist/numeric ratings show sufficient variability") indicate that faculty were more likely to use the entire scale when completing the O-EDShOT. A common threat to the validity of workplace-based assessments that use traditional anchors, such as the daily encounter card, is range restriction effects [8, 12–16, 27, 28]; in other words, the tendency to rate aspects of a trainee's performance in a narrow range of the scale provided, making it difficult to

discern strengths and weaknesses [8, 29, 30]. Our findings align with the existing literature and demonstrate that assessors make greater use of the full scale when tools incorporate entrustment-type anchors such as those used in the O-EDShOT, compared to tools that use traditional anchors [8, 27, 28]. This may also explain why item 4 ("Comments justify the ratings") also demonstrated significantly higher CCERR scores for the O-EDShOT. Previous studies have demonstrated that faculty and trainees perceive the behavioural anchors of the O-EDShOT scale to more accurately represent assessors' day-to-day judgments of performance based on the degree of supervision required [5, 14, 16, 25]. This facilitates more discriminating ratings leading to greater alignment with the narrative comments and identification of strengths and areas for improvement. When ratings and comments are congruent, feedback is perceived as more meaningful and credible to the trainee, while also contributing important data for high-stakes progress and promotions decisions made by the competence committee [13, 15, 16, 31, 32].

We also observed significantly higher scores on CCERR item 9 for O-EDShOTs. Item 9 asks the rater whether the "...assessment provides enough detail for an independent reviewer to clearly understand the trainee's performance on the shift", and essentially represents a gestalt utility judgment of the completed assessment. Our finding that item 9 demonstrated higher mean scores for the O-EDShOT compared to the daily encounter card further supports that not only is the quality of the O-EDShOT superior, but the O-EDShOT also seems to offer greater utility as an assessment tool for capturing trainee on-shift performance.

Clinical implications of findings

The CCERR provides a quantitative measure of the degree to which a completed workplace-based assessment provides numeric ratings that adequately capture performance as well as narrative comments that are specific, detailed, and use concrete examples [17]. Context-rich narratives of performance and ratings that discriminate between a trainee's strengths and areas for improvement are important springboards for actionable feedback for learning [33, 34]. Additionally, they are critical for contributing meaningful data to the larger system of assessment used by competence committees [3, 4, 35]. Therefore, our findings suggest that the O-EDShOT produces higher-quality assessments compared to the daily encounter card. While prior studies have demonstrated the strong psychometric properties of the O-EDShOT, this study suggests that the O-EDShOT provides better quality assessments [5].

With the implementation of competency-based medical education in Canada, emergency medicine (EM) programs have shifted to a workplace system of assessment

largely centred around Entrustable Professional Activities (EPAs)—discrete tasks of the discipline [38]. Despite this shift, there remains an important role for assessments of performance over the entire shift. Critics of EPAs argue that deconstructing physician competence into discrete tasks is overly reductionist and may not capture the learner's ability to simultaneously integrate multiple competencies in real-world practice [39, 40]. While the collection of EPAs in the EM transition to practice stage of training attempt to assess higher-level competencies, they still represent discrete tasks (e.g., managing ED flow, supervising learners) that are assessed independently [41]. Furthermore, with the implementation of EPAs, there have been increasing reports of residents and faculty “gaming the system” by selectively completing EPA assessments that are perceived more favorable for progress or to avoid negative feedback, thus threatening the authenticity and validity of those results [42–47]. These concerns point to an ongoing need for a holistic method of assessing performance over an entire shift. The ED shift is the unit of work of an emergency physician. The pragmatic outcome of EM training is to produce physicians who can safely run an ED shift. The O-EDShOT provides a measure of a resident's readiness to do so by assessing the integration and application of multiple competencies over the entire shift. This study and our prior work provide multiple sources of validity evidence for the use of the O-EDShOT which may offer complimentary performance data to the existing EM EPA system of assessment [5].

Strengths, limitations and future directions

A strength of this study was the use of the A-CCERR to examine the effects of lack of blinding. Our raters could not be blinded to the workplace-based assessment tools while using the CCERR. The A-CCERR does not require raters for scoring, obviating the need for blinding [21]. Notably, the O-EDShOT demonstrated significantly higher mean CCERR and A-CCERR scores, suggesting that the inability to blind CCERR raters did not bias our results [21, 36, 37].

The major limitation of this study is that it was conducted at a single centre. Different institutions likely have unique assessment cultures, and as such, the findings of this study may not be transferable across different training programs. Therefore, we intend to conduct a multicenter implementation study of the O-EDShOT to collect additional validity evidence across training programs with varying assessment systems and cultures.

Conclusion

The O-EDShOT produces higher-quality assessments compared to the traditional end-of-shift daily encounter card as measured by the CCERR. It offers the potential for greater

utility as an assessment tool for capturing trainee on-shift performance that can be used as a stimulus for actionable feedback and a source for high-quality workplace-based assessment data to inform decisions about EM trainee progress and promotion.

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Compliance with ethical standards

Conflict of interest The authors declare that they have no conflict of interest.

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