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REVIEW

Evaluating medical residents as managers of care: a critical appraisal of assessment methods

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Introduction: The increasing demands for effective and efficient health care delivery systems worldwide have resulted in an expansion of the desired competencies that physicians need to possess upon graduation. Presently, medical residents require additional professional competencies that can prepare them to practice adequately in a continuously changing health care environment. Recent studies show that despite the importance of competency-based training, the development and evaluation of management competencies in residents during residency training is inadequate. The aim of this literature review was to find out which assessment methods are currently being used to evaluate trainees' management competencies and which, if any, of these methods make use of valid and reliable instruments.

Methods: In September 2012, a thorough search of the literature was performed using the PubMed, Cochrane, Embase®, MEDLINE®, and ERIC databases. Additional searches included scanning the references of relevant articles and sifting through the "related topics" displayed by the databases.

Results: A total of 25 out of 178 articles were selected for final review. Four broad categories emerged after analysis that best reflected their content: 1) measurement tools used to evaluate the effect of implemented curricular interventions; 2) measurement tools based on recommendations from consensus surveys or conventions; 3) measurement tools for assessing general competencies, which included care-management; and 4) measurement tools focusing exclusively on care-management competencies.

Conclusion: Little information was found about (validated) assessment tools being used to measure care-management competence in practice. Our findings suggest that a combination of assessment tools should be used when evaluating residents' care-management competencies.

Keywords: care management, management, competency, CanMEDs, ACGME

Introduction

The professional training of health care providers is currently undergoing intensive reform, and this has in part, been linked to the rising demands for cost-effective and efficient health care delivery. Consumers of care are also demanding more accountability from their health care providers, resulting in an expansion of the desired professional competencies of physicians at the time of graduation, across and within the continuum of health care.[1–3] In addition to the basic clinical knowledge[4] and skills that residents need to acquire during their basic and specialty training, it is also expected that they are competent in other domains of medicine that would enable them to practice adequately in a continuously changing health care environment.[1,5]

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In a wave of educational reform that has been characterized by the revision of the curricula of several national and individual postgraduate medical training programs, competency-based medical education has emerged as a preferred educational approach to address the changing societal needs. The Royal College of Physicians and Surgeons of Canada, the Accreditation Council For Graduate Medical Education (ACGME) in the United States,[6] and many more professional bodies in different countries have all formulated a broad range of knowledge, skills, and attitudes that physicians are required to master upon graduation. These knowledge, skills, and attitudes, collectively defined as "competencies", have been bundled into various forms and packaged into different educational frameworks for training physicians.[6–8] The Canadian Medical Education Directives for Specialists (CanMEDS)[7] framework includes the roles as medical expert, scholar, health advocate, manager, collaborator, communicator, and professional, while the ACGME includes practice-based learning and improvement, patient care, professionalism, interpersonal and communication skills, medical knowledge, and systems-based practice.

So far, the outcomes of many of these initiatives have shown that graduating physicians feel inconsistently prepared in a lot of their expected physician roles, especially in the domains of manager and health advocate. Furthermore, while they consider the defined professional competencies to be at least moderately important,[9] several studies show that the attention given to the development of management competencies in many medical training programs is currently insufficient.[1] This is despite the perceived importance of competency-based training in the different professional domains.[3,10–12] While there is no single comprehensive definition of the manager role in health care, it is generally considered that physician managers are integral participants within health care organizations, are responsible for organizing sustainable practices, and also contribute to the effectiveness of the health care system.[6,7] The role as manager as described by the CanMEDS framework includes key competencies that are aimed at raising residents' awareness of the health care system and how to act responsibly within the system. Some of the areas these key competencies focus on include participation in activities that contribute to the effectiveness of the health care system, management of practice and career choices, the allocation of finite health care resources, and how to serve in administrative and leadership roles.[7] The ACGME competencies of system-based practice, on the other hand, demand responsibility within a larger context of the health care system, where residents are expected to be able to make effective use of health care resources in providing care that is of optimal value. Due to the similarities within these frameworks, however, and for the sake of clarity, we have chosen to coin the management competencies referred to in this article as "care-management".[13]

Context

In 2005, a new competency-based medial curriculum for all Dutch postgraduate medical programs was implemented in the Netherlands. The role as manager was one of the seven competencies of this new curriculum, which following implementation, turned out to be one that needed further clarification in terms of definition, interpretation, and evaluation in clinical practice. We carried out a number of studies to investigate an appropriate definition of this competency in practice as well as for the requirements needed to develop management competencies in residents during training.[14,15]

The findings from the different studies we conducted revealed that specific care-management training was necessary in both the undergraduate and postgraduate training of medical doctors in the Netherlands, and that formal training in this field was lacking. In separate studies investigating the perceived competence and educational needs in health care-management among medical residents, we also found that residents' perceptions of care-management competencies in certain areas were inadequate.[15,16] We therefore embarked on a project to design an educational intervention using the information we had gathered from previous research.[3,12,14,15] However, for us to be able to measure the impact of our program or any changes that may occur in the residents as a result of our intervention, we realized that there was a need for valid and reliable assessment tools to measure the outcomes and also because providing constructive feedback (ie, both summative and formative) was an essential element of competency-based training.

There are a number of studies in the literature that have attempted to evaluate the impact of management training programs in many postgraduate medical institutions. The evaluations used in most of these studies, however, have been based upon trainee attendance, trainees' evaluation of the programs, and in a few studies, pre- and post-test assessments of trainees' knowledge of health care-management.[3] While many of the studies showed significant improvement in knowledge, the extent to which the trainees effectively applied the theory into practice after participation in these programs remains unknown. Furthermore, the question remains as to whether assessment tools are available that

can objectively measure whether the desired competencies were achieved and, if so, how reliably they can be measured in the clinical work environment.[3,12,14,15]

It is obvious that the application of concrete assessment tools to vague conceptual constructs like "care-management" is a challenging task. This is because implicit within the concepts of reliability and validity rests the assumption of a stable, meaningful, quantifiable entity that can be measured, and that repeat measures applied to similar instances will produce similar results (reliability). In addition, it is expected that the reliable results will closely reflect an independent, broadly accepted "gold" or reference standard (validity). For this purpose, we chose to conduct a literature review to determine the content and attributes of reliable assessment tools, which could be used to evaluate medical residents' care-management competencies. The main questions we set out to answer included:

1. which specific assessment methods are currently being used to evaluate medical residents' care-management competencies;
2. which of these methods, if any, are valid and reliable; and
3. based on the evidence in the literature, what is the most reliable tool or assessment method for demonstrating physicians' managerial "competency" in the clinical workplace?

Methods

Search strategy

In September 2012, a comprehensive search of the literature using the PubMed, Cochrane, Embase®, MEDLINE®, and ERIC databases was performed. We set out to identify all relevant literature that could inform us about effective and reliable assessment practices and tools currently being used or that could be used, to evaluate care-management competencies in medical residents. The keywords we initially used in our search strategy included "management", "leadership", and "education" which resulted in 9,058 hits. We therefore combined these broad terms in strings with more specific terms such as "care-management", "assessment", and "competency", which resulted in 178 hits. The scope over which the searches were conducted included all available entries until November 2012, and these differed between databases – for example, MEDLINE (from 1946 to November 2012), Embase (from 1974 to November 2012), and PubMed (from 1953 to November 2012). Our search queries were saved and were rerun weekly from September through November 2012 to ensure that new publications were captured. New results were reviewed, and articles that met the eligibility criteria were included in the review. To be eligible for inclusion, each article had to focus on assessing management competency for medical students, residents, or fellows (for comprehensiveness of the continuum of training), published no earlier than 1950, and in no other language than English and Dutch. Criteria for exclusion were defined as articles which either did not have management skills or education as the major topic or did not contain (specific) outcome or information about care-management competency among the professional competencies that were evaluated in the studies. We performed additional searches to determine whether we had missed any relevant articles by scanning references of the eligible articles and sifting through "related topics" displayed by the databases.

The 178 hits from our search in the PubMed, Embase, MEDLINE, ERIC, and Cochrane databases were reviewed, and after elimination of articles that were cited twice, we were left with a total of 120 articles. Two authors (LMG and LAS) independently determined the focus of each article by reviewing the abstract, and an article was selected for detailed examination if it satisfied the criteria for inclusion or if the authors could not exclude the article based on its abstract alone. A total of 26 potentially relevant articles were retrieved in full text after this round, and another 16 articles were found after scanning the related articles or references of the relevant articles. The resultant 42 articles were screened again in detail by each author, independently. In cases where there was no agreement on content, the two authors (LAS and LMG) tried to resolve this through consensus. Where a resolution could not be obtained, a third author (JOB) was consulted as arbiter. After this stage of the screening process, 25 articles were finally selected for the review process. For a comprehensive overview of the selection see Figure 1.

Results

The 25 articles that were finally selected for the review showed, on further analysis, a certain degree of overlap in content, which resulted in four broad categories. These categories were labeled as follows: 1) assessment tools used to evaluate the effect of implemented curricular interventions; 2) assessment tools based on recommendations or views from consensus surveys or conventions; 3) assessment tools intended for assessing general competencies, which included care-management; and 4) assessment tools that focused exclusively on care-management competencies. Tables 1 and 2 list our findings for each article category.

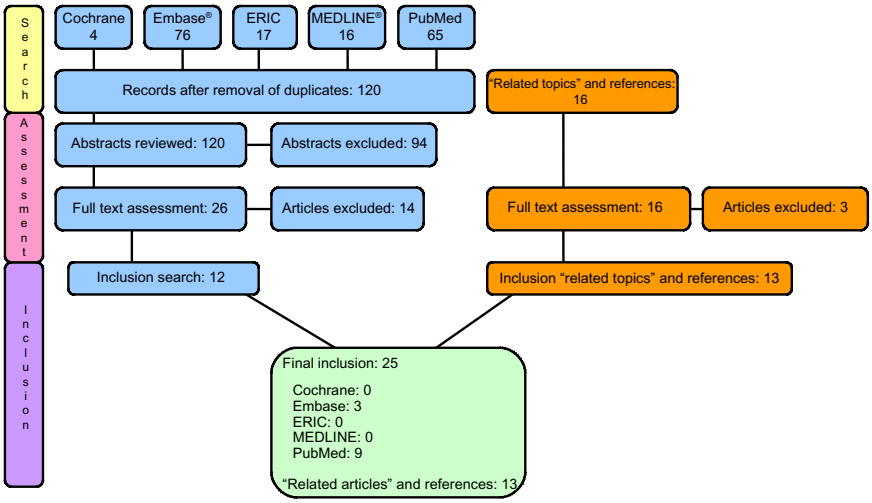

Figure 1 Flowchart illustrating the various stages of the inclusion process.

Category 1 – assessment tools used to evaluate the effect of implemented curricula interventions

In our review of articles used to measure residents' care-management competencies, we found ten articles that measured trainees' care-management competencies as a means of measuring the impact of the implemented curricula interventions.[17–26] The tool that most of the reviewed articles (n=7) used was a self-designed pre- and post-test, most often designed by the course director, lecturers, or author. In some cases, the development of the test was not further clarified/specified.[19–22,25,26] Most articles tested the residents on knowledge (N=4), comprehension (N=1), or perceived knowledge/comfort (N=1) regarding care-management related topics.[19,21–23,25,26] One study reported an improvement in knowledge but was unclear about the content of the multiple-choice questions (MCQs) in their self-designed pre- and post-test.[20] Two studies described assessments using a (modified) 360° evaluation tool (also known as multisource feedback [MSF]).[17,18] Only one article described an evaluation by means of coding compliance and accuracy.[24] None of the articles reported any evidence in the literature or results about reliability or validity of the assessment tool. Furthermore, all of the articles, except one, contained small study groups or did not report the total amount of residents participating in the program.[17–26]

Category 2 – assessment tools based on recommendations or views from consensus surveys or conventions

In this section, only one article was found that described assessment tools based on the recommendation of a consensus report or expert opinions.[27] The article described the outcomes of a consensus conference in October 2001, organized by the University of Michigan and held near Detroit. The aim of the conference was to address the need for agreement and data on the best practices in assessment of the care-management competency. The article highlighted the best-practice assessment tool (based on relative strengths, weaknesses, and costs) for specific domains, with specific attention for care-management, based on consensus of nationally recognized experts in graduate medical education. Furthermore, it was concluded in the paper that a combination of assessment tools gave an accurate reflection of the resident's competence and may allow for more divided gradations of competency. Residency programs were recommended to shape their own assessment systems to best address local needs and resources. In addition, the development and evaluation of more novel methods, including research in the field of computerized simulations of practice situations, was recommended.[27]

Category 3 – assessment tools intended for assessing general competencies, which included care-management

We found 12 articles that described assessment tools used to measure care-management as part of the general evaluation of trainees' ACGME or CanMEDS competencies.[28–37] In the majority of these studies, new assessment tools were developed or previously known ones modified for this purpose.[29–32,34–36,38] Two articles evaluated self-developed oral simulated clinical examination (OSCE).[29,32] The OSCEs in these studies had several stations, in order to assess residents'

Table 1 Summary of categories 1 and 2

Study	Method	Target group (number)	Comments	Statements about assessment tool
Essex and Jackson[22]	Pre- and post-test 65-item knowledge questionnaire (true/false/do not know).	N=40 34 trainees and 6 trainers	Highly significant increase in knowledge.	None
Junker et al[25]	Pre- and post-test evaluation of perceived knowledge of PM (0–5 scale). Standardized clerkship evaluation of PM module.	N=16	74% increase in perceived insurance issues knowledge; 27.7% increase in perceived managed care knowledge. 65% increase in perceived financial management knowledge; 41.4% increase in perceived laws and regulations knowledge. Curriculum was rated excellent in every area.	None
Kochar et al[17]	Development of a 360° assessment tool based on ACGME-competencies. Needs-assessment.	N=685 residents and fellows in 84 programs	Continuing redesigning residency trainings environment.	None
Bayard et al[21]	Pre- and post-test evaluation. 13-item self-assessment of knowledge/comfort of practice evaluation management curriculum (Likert scale 0–4). Evaluation of curriculum.	Not reported	(Strongly) agreed that the course was beneficial; increased interest and knowledge in PM. Mock practices were the glue that kept the didactic sessions together; increased interest in PM.	None
Higgins et al[18]	Developed a (45-item and three open-ended questions) 360° evaluation tool based on ACGME-competencies.	N=6 residents	Offers a comprehensive picture of an individual's performance, facilitates self-awareness. Combination of tools gives possibly most accurate and reliable view.	None
Babitch and Chinsky[20]	Pre- and post-test (MCQ) executive leadership in health care-management.	Not reported	Slight improvement in post-test.	None
Babitch[19]	Pre- and post-test five questions about comprehension of the lecture content. ACGME and AAP-based curriculum. Standard satisfaction surveys for curriculum content.	Not reported	20%–40% improvement in comprehension.	None
Hemmer et al[23]	Pretest 20-item closed book and post-test 22- or 50-item open-book/note knowledge about key topics. Evaluation of curriculum content (scale 1–5).	N=16	Short-term understanding of leadership and management concepts seems to improve.	Validity was not measured
Jones et al[24]	Surgical coding compliance. Evaluation for each of the PM lectures (Likert scale 1–5).	Not reported	Surgical compliance increased from 36%–90% over a 12-month period. Evaluation scores ranged from 4.1–4.8 (average 4.3) (1= information not very pertinent – 5= information very pertinent).	None
LoPresti et al[26]	Pre- and post-test 40-item (25 MCQ + 15 Pick N type questions) knowledge test (constructed according to NBME-guidelines) to assess application based on AAFP and ACGME.	N=28 tests by 17 residents Pre-test N=17 Post-test N=11	Overall scores about PM knowledge improved in 7/14 areas in the intervention group. The comparison group improved more than the intervention group in the taxation topic.	Judged to have content validity No construct validity
Frohna et al[27]	OSCE, patient satisfaction, 360° evaluation, fishbowl evaluation. Clinical supervisor evaluation, SPs, written examinations. Computer-based PM problems, portfolios.	Not reported	Features a multifaceted assessment system that includes elements of each of Miller's four levels of competence. Critical for obtaining an accurate picture of learners' competency and may allow finer gradations of competency. However, individual residency programs need to shape their own assessment system in a way that addresses the local needs and resources best.	None

Abbreviations: AAFP, American Academy of Family Physicians; ACGME, Accreditation Council of Graduate Medical Education; MCQ, multiple-choice question; NBME, National Board of Medical Examiners; OSCE, objective structured clinical examination; PM, practice management; SP, standardized patient encounters; AAP, American Academy of Pediatrics.

Table 2 Summary of categories 3 and 4

Study	Assessment tool/method	Target group (number)	Comments
Reisdorff et al[38]	Modified current evaluation instrument based on ACGME-competencies.	Not reported	A practical method was proposed for modifying an existing evaluation tool to use in assessing residents' GCs.
Swing[39]	Development and implementations of assessment methods based on ACGME framework; ratings, checklists, 360° evaluations, structural oral examinations, structured case discussion, simulators, models, simulations, and portfolios.	Not reported	Assessment approaches that tend to have a higher reliability are OSCEs, SP exams, and checklists. OSCE and SP exams seem to be the best method for conducting assessment for high-stakes decisions, advised to complement with snapshot assessment methods. 360° evaluation and portfolios may provide unique insights and should be further developed and tested.
Reisdorff et al[35]	Modified a 61-item global assessment device. Ordinal scale 1–9.	N=150 emergency medicine residents	Valid evaluation items for assessing GCs were developed by using a structured process. It is challenging to measure objective dynamics in addition to more objective, behavior-driven competencies.
Silber et al[30]	Modified global rating form assessment of 23 items based on ACGME competencies. (1–5 scale).	N=1,295 residents	Global rating forms were the most often used tool to assess residents' GCs, may not be adequate to distinguish among the six ACGME GCs.
Weigelt et al[34]	Developed a 23-item 360° evaluation based on the ACGME-competencies. Likert scale 1–9.	N=10 residents	Compared with traditional ratings, 360° evaluation adds limited new information.
Roark et al[37]	Online assessment system for surgical post-graduate ACGME-based education to support implementation of various instruments; mini-clinical examination exercise, 360° assessment, oral presentation of research projects, written examination, in-service examination, and documentation of surgical experience.	N=1,336 evaluations residents otolaryngology	This study revealed significant difference among evaluators in total (all GCs) average score. Further conclusions are hard to draw and further experiments and research are needed.
Jefferies et al[32]	Developed a 10-station OSCE based on the CanMEDS competencies.	N=24 candidates, 13 faculty members	The OSCE may, despite the resource intensity and high costs, be useful as a reliable, valid assessment method to simultaneously assess multiple GCs.
Chou et al[28]	Two-question survey to measure use and satisfaction of: ITER, MCQ, SAQ, essay, oral examination, OSCE, simulation, and logbook. Likert scale 1–5.	N=280 program directors	ITER was the tool used mostly to assess management competency. Program directors concerned about assessment of management role in their programs. Satisfaction with evaluation management role (1= very dissatisfied), mean (SD): 2.95 (0.84).
Lee et al[31]	Report experience using implementation matrix of ACGME competencies. Tools used: OSCE, 360° evaluation, and portfolio.	Not reported	Provided specific practical solutions for overcoming the identified barriers.
Lurie et al[33]	A systematic review of assessment tools for ACGME competencies. Global rating form, 360° evaluation, direct observation, and portfolio.	N=56 articles	No evidence found that current assessment tools can assess the ACGME GCs independently of one another.
Varney et al[36]	Designed a developmental criterion-referenced assessment (CoBRA). Likert scale 1–9. Descriptive anchors. Compared ABIM score.	N=2,941 CoBRA N=3,648 ABIM form	Labor-/time-intensive project, but with positive returns: ongoing faculty development, focus on evaluation as a part of teaching, and the explanatory effect on goals and objectives within our department.
Garstang et al[29]	OSCE 9-station based on ACGME-competencies developed by OSCE committee (authors and department member). Compared with ABPMR scores.	N=9 residents	OSCE management scores had a (not significant) positive correlation with ABPMR part 1 scores. OSCE management scores had a (not significant) negative correlation with ABPMR part 2 scores.

Dyne et al[42]	SBP assessment tools: direct observation, global rating, 360° evaluation, portfolios, standardized oral examinations, written MCQs, chart-stimulated recall oral examination, OSCE, and patient survey. ACGME-based curriculum.	Not reported	Primary assessment methodologies: direct observation, global ratings, 360° evaluation, portfolio assessment. Testing: oral and written.
Kolva et al[40]	A systematic review of ACGME-competencies in PM curriculum: ITER, MCQs, SAQs, essays, oral examinations, OSCEs, simulations, and logbooks.	N=33 articles	Few studies on long-term outcomes of PM-related curricula. New PM curricular material developed should be evaluated and results should be published.

Abbreviations: ABIM, American Board of Internal Medicine; ABPMR, American Board of Physical Medicine and Rehabilitation; ACGME, Accreditation Council for Graduate Medical Education; CanMEDS, Canadian Medical Education Directives for Specialists; CoBRA, competency-based resident assessment; GC, general competencies; ITER, in-training evaluation report; MCQ, multiple-choice question; OSCE, objective structured clinical examination; PM, practice management; SAQ, short-answer question; SBP, systems-based practice; SD, standard deviation; SP, standardized patient encounters.

competencies, including the care-management competency. While Jefferies et al[32] concluded in their study that "the OSCE could be useful as a reliable and valid method for simultaneously assessing multiple physician competencies", Garstang et al[29] did not find any significant correlations between ABPMR (American Board of Physical Medicine and Rehabilitation) scores and OSCE scores on the manager role. We also found two articles that described the use of global rating forms to measure residents' general competencies including care-management.[30,35] Both studies modified and subsequently evaluated an existing global rating form. While Silber et al[30] argued that global rating forms may not be an appropriate instrument for distinguishing between the six ACGME general competencies, Reisdorff et al[35] focused on the psychometric aspects of global rating forms and noticed a significant increase in general competency scores for each year of training in every general competency category. None of these papers, however, satisfied our criteria for being valid and reliable assessment methods.

Two other articles developed an MSF evaluation tool to assess the six ACGME general competencies that included system-based practice as a measure of residents' managerial and leadership competencies.[34,37] Weigelt et al[34] concluded that "MSF (or 360° evaluation) forms provided limited additional information compared to the traditional faculty ratings" in their residents in the trauma or critical services training program. The second study showed a significant difference in general competency scores when assessed by different evaluators.[37] Other papers we examined revealed mere descriptions of assessment tools that were currently in use in various curricula, eg, MSF evaluation, OSCE, and portfolio,[31] as well as an inventory and perceived satisfaction of assessment tools that program directors were using in care-management training.[28] While a broad range of assessment tools were named, ie, MCQs, short-answer questions, essay, simulations, logbook, in-training evaluation report, oral examinations, and OSCE, the number of assessment tools used for evaluating the roles as collaborator and manager were remarkably less, compared with the other CanMEDS competencies. However, the majority of the program directors used in-training evaluation reports to assess care-management competencies, followed by MCQs and short-answer questions.

Two articles were themselves reviews of assessment tools used to assess general competencies of the ACGME curriculum. Both articles investigated the literature on the ACGME toolbox as well as different assessment tools.[33,39] According to Swing,[39] OSCEs and standardized patient

exams seemed to be the best methods for assessing high-stakes decisions. They recommended the complementary use of assessment methods that involved observation of interaction focused on specific aspects of residency performance (checklists and structured case-discussion orals).[39] Portfolios and 360° evaluation were reported as having the potential to provide unique insights into the performance of the resident, and should be further developed and tested.[39]

In the other review, the authors concluded that it was seemingly impossible to measure the competencies independently of one another in any psychometrically meaningful way. However, they recommended not abandoning the general competencies but, instead to develop a specific and elaborate model to rationalize and prioritize various assessment instruments in light of the general competencies.[33,40] Again, while both reviews identified assessment tools that were being used to evaluate general competencies, none of them identified the specific tools that could (singly or in combination) be used to reliably measure care-management competencies in physicians.

Category 4 – assessment tools for care-management competencies

In this category, only two articles were found that focused on assessment tools designed specifically for assessing care-management competency. One article was a literature review and discussed the use of portfolios, MCQs, OSCEs, and checklists in practice-management curricula.[41] The majority of the articles included in this review used one assessment tool for assessing the management competency. The authors noticed that checklists were the most common method of assessment within practice-management curricula, and the portfolio was the most common tool for assessing general competencies. A remarkable finding in the review was that only one study used long-term outcome measures.[40] The other article we found described a broad range of assessment tools: direct observation, global rating, 360° evaluation, portfolios, standardized oral exams, chart-stimulated recall oral examinations, OSCEs, and patient surveys.[42] It was concluded, based on consensus of conference proceedings, that a few primary assessment tools could be used for measuring the management competency of emergency medicine residents, namely, direct observation, global rating forms, 360° evaluations, portfolios, and knowledge testing: both oral and written.[42]

Discussion

The aim of this review was to examine which assessment methods were currently being used to evaluate medical residents' care-management competencies, to determine which of these methods, if any, were valid and reliable, and finally, based on the evidence in the literature, identify the most reliable tool or method of assessment for demonstrating physicians' managerial competencies in the clinical workplace. The rationale for this review lay in the need for a method that could reliably assess residents' management competencies within a competency-based educational framework. While assessment tools, either formative or summative, are expected to be competency specific, there is ongoing discussion about the feasibility of competency-specific training and assessment methods, and many educational programs are still being designed with the focus on specific competencies being set apart.

To begin with, our findings showed that many postgraduate education programs use global rating forms for evaluating general and specific competencies of their residents.[30,33,39,40] This is remarkable considering that there is a lot of evidence that demonstrates that global rating forms have serious limitations[30,33,39] and that they provide little or no information that can be used for constructive feedback to the trainees.[39] Nonetheless, it was still recommended that global rating forms should be considered in combination with other assessment tools for assessing physicians' care-management competencies.[39,42] Our findings also showed that 360° evaluations provided trainees with valuable information about their competencies in general,[18] although the instrument was not considered to be a useful tool to measure specific competencies independent of other instruments.[33,34] Also, the reliability of this assessment tool was dependent on the instructions given to the raters, having the right number of evaluators, maintaining confidentiality, and how well-defined the competence-domains were.[34] While the face validity of this tool is high by design (due to multiple perspectives represented and the number of evaluators involved), there is little data published about its content validity.[18,42] We also discovered that OSCEs were widely used tools in assessing both the skills and knowledge of residents, as well as their roles as medical experts and communicators.[32] However, Frohna et al[27] felt that this assessment tool needed further evaluation, especially in the domain of care-management.

Although portfolios have been found to provide residents with a good view of the gaps in their knowledge and promote independent learning,[42] we discovered that they were considered time consuming as assessment tools for measuring care-management competencies. This was because of the diversity of content they contain and the lack of a validated instrument to "grade" portfolios.[31,39] Nonetheless, they were

considered to be useful for the assessment of certain dimensions of the competency as manager that otherwise would be difficult to assess using other methods, eg, systems-based practice.[39]

Many of the articles we found showed that there is no single assessment tool that can provide sufficient information about the development or current level of competence in trainees and that a combination of tools would be necessary to measure residents' level of care-management competence in a valid way. Our findings fall in line with the report by van der Vleuten and Schuwirth[41] who proposed that the combination of qualitative and quantitative assessments in evaluating professional behavior during training was apparently superior for assessing clinical competence. They argued that it was impossible to have a single method of assessment capable of covering all aspects of competencies of the layers of Miller's pyramid. Hence, a blend of methods were needed, some of which will be different in nature and which could mean less numerical with less standardized test-taking conditions. According to the authors, there were no inherently inferior assessment methods for measuring professional competency and that the reliability of any assessment (tool) depended on sampling as well as on how they were applied in clinical practice. The authors pleaded for a shift of focus regarding assessment, away from individual assessment methods for separate parts of competencies towards assessment as a component that is inextricably woven together with the other aspects of a training program. This way, assessment would change from a psychometric problem to be solved by a single assessment method to an educational design problem that encompasses the entire curriculum.[41] It is our firm belief that such a combination of assessment methods would be applicable in the area of care-management competency assessment, despite the fact that findings from our review did not support a particular combination of assessment tools.

In many of the articles we reviewed, we found that it was difficult to unambiguously discriminate between what was being measured in terms of care-management "competency" and management "competence". While competence as a generic term describes an individual's overall ability to perform a specific task and refers to the knowledge and skills the individual needs to perform the particular task,[43] competency, on the other hand refers to specific capabilities, such as leadership, collaboration, communication, and management capabilities demonstrated while performing a task. Competence is considered a habit of lifelong learning rather than an achievement, reflecting the relationship between a person's abilities and the task to be performed.[44–46] Competency, however, involves the collective application of a person's knowledge, skills, and attitudes and is aimed at standardizing how knowledge, skills, and abilities are combined in describing what aspects of performance are (considered) important in particular areas. A trainee's clinical reasoning may therefore appear to be competent in areas in which their knowledge base is well organized and accessible but may appear to be much less competent in unfamiliar contexts.[4,47] The objective of the ideal assessment tool is therefore to improve trainees' overall performance by providing insights into actual performance, stimulating the capacity to adapt to change and possessing the capacity to find and generate new knowledge.[47,48]

There are a few limitations in this study that are worth mentioning. We might have missed some relevant and helpful articles on the subject by restricting the scope of the search to English- and Dutch-language articles. As we only reported literature published in educational and biomedical journals, it is possible that effective assessment initiatives in residency programs were left out of our search and the review. It is also possible that we omitted a number of ongoing studies that fell out of the specified search period of our study. We believe, nonetheless, that our extensive and systematic methodological approach would have limited the chances of missing critical information.

Although we could not identify a single valid, feasible, and/or reliable care-management assessment tool from the literature review, we discovered various tools that were being combined in different ways to assess the care-management competencies of residents in clinical practice. Our findings suggest that the use of a single assessment tool is insufficient for measuring the care-management competencies of residents and that a combination of qualitative and quantitative tools would be highly preferable.[41] Also, educators and trainers need, in the absence of a single assessment tool, to combine different assessment tools during training to obtain a better perspective of the resident's care-management competency level. We believe that a combination of 360° evaluation, portfolio, and assessment of individual projects would be an interesting combination of assessment tools to use in daily practice. For example, 360° evaluation could be useful for evaluating care-management competencies during tasks such as chairing a meeting or the management of a ward. Portfolios would add self-evaluation and perhaps a summary of care-management tasks and interest, while conducting individual projects would provide residents with opportunities to develop their care-management competencies and leadership abilities.

Finally, in addition to determining the validity and reliability of existent assessment tools in health care-management and how they can effectively be used to monitor and improve physician care-management competencies, our recommendation for additional research would include investigating which combinations of assessment tools would yield reliable assessments of care-management in clinical practice. Interesting areas worth further investigation include subdomains of care-management, eg, levels of management competency that should be made mandatory and those which should be optional for physicians to master. It would also be interesting to perform further research on how physicians, educators, and medical managers personally perceive how care-management competencies should be evaluated and also explore the specific essential management skills and knowledge that should be evaluated.

Disclosure

The authors report no conflicts of interest in this work.

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