Conceptual framework for performance assessment: Competency, competence and performance in the context of assessments in healthcare – Deciphering the terminology

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Abstract

Background: The definitions of performance, competence and competency are not very clear in the literature. The assessment of performance and the selection of tools for this purpose depend upon a deep understanding of each of the above terms and the factors influencing performance.

Aim: In this article, we distinguish between competence and competency and explain the relationship of competence and performance in the light of the Dreyfus model of skills acquisition. We briefly critique the application of the principles described by Miller to the modern assessment tools and distinguish between assessment of actual performance in workplace settings and the observed performance, demonstrated by the candidates in the workplace or simulated settings.

Results: We describe a modification of the Dreyfus model applicable to assessments in healthcare and propose a new model for the assessment of performance and performance rating scale (PRS) based on this model.

Conclusion: We propose that the use of adapted versions of this PRS will result in benchmarking of performance and allowing the candidates to track their progression of skills in various areas of clinical practice.

Introduction

In the literature, there is a degree of confusion about 'competence-based assessments', 'performance-based assessments' and 'competency-based assessments'. This confusion is mainly caused by using the terms 'competence' and 'competency' interchangeably. Further, many authors distinguish between the assessment of performance and the assessment of competence (Epstein & Hundert 2002; Ruedy 2007). This notion that competence and performance are two separate domains might have originated from Chompsky's work on linguistics where he had distinguished between the two (Westera 2001). Such a distinction is at complete odds with the spectrum of skills acquisition described by Dreyfus and Dreyfus (1980), in which competence is a point on the spectrum of improving performance. Hence, by this inference all 'assessments of competence' are 'assessments of performance', and there should be no distinction between these two. This confusion could be easily resolved by understanding the correct meanings of each of these terms and using these appropriately. Murphy et al. (2009) have also highlighted the problem of a lack of consistency in defining competence and performance. Further, one of the recommendations in the 'performance in assessment, consensus statement' is to 'ensure that there is a consensus around the use and abuse of terminology' (Boursicot et al. 2011). In this article, we would like to decipher the terminology and propose a new, clear and practically applicable model suitable for use with modern complex assessments of performance. This model distinguishes between observed and unobserved performance, in workplace and simulated settings, treating competence as a point on the spectrum of performance.

Practice points

- Competency is a skill and competence is the attribute of a person.
- Competence is a point on the spectrum of improving performance.
- Performance is affected by a multitude of factors.
- Performance can be classified as 'Actual Performance' and 'Observed Performance', for assessment purposes.
- PRSs should be developed and used for assessment of performance.

Relationship of knowledge with performance

Before we start a discussion on performance and competence, it is important to briefly understand the relationship of

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knowledge with performance. Knowledge is a stable entity associated with the representation of facts, procedures, principles and theories in any particular domain. In turn, application of knowledge represents an intellectual capability to use information in a sensible, meaningful way and it is assumed to emerge when existing knowledge is brought to bear on new situations. Cognitive skills can be defined as mental operations that process the knowledge (Westera 2001). Cognitive skills are also associated with higher order activities like problem solving, reasoning, thinking, assessing, concluding, and include the mental processes of analysis, synthesis and evaluation (Krathwohl 2002). Performance depends on these cognitive skills, alongside other psychomotor and affective skills as applicable, under the influence of a variety of factors, as described in detail later.

Performance

The Oxford English Dictionary defines performance as 'the action or process of performing a task or a function'. Performance of any individual in a clinical environment is a very complex construct which is influenced by a multitude of factors. Such performance is a composite of (clinical) cognitive, psychomotor and affective abilities (attitudes) of the individuals alongside their non-clinical skills like team working, situational awareness, etc. The performance is further confounded by individuals' personality traits as mentioned earlier. In addition to all the above, environmental, psychological and physical factors also come into play in determining how individuals perform (Figure 1).

It is relatively easy for the individual to learn the factors shown in the grey boxes to improve their performance. The black boxes show the factors which also influence performance, but it is not easy for the individuals to acquire skills which allow them to modify their performance under a range of these conditions. For instance, if an individual gets stressed easily which in turn affects their performance, it is not easy to teach or train them not to get stressed or perform better while stressed. The above combinations of factors make performance a variable trait as opposed to knowledge which is a stable entity, as shown by many studies (Page & Fielding 1980; Rethans et al. 1991; Ramsey et al. 1993; Ram et al. 1999b; Southgate et al. 2001).

Let us assume that an individual is proficient in performing the insertion of an intercostal drain in a porcine carcass model. Does this mean that the same person will have similar level of performance while performing this procedure in a stable patient on a medical ward and in turn would perform at the same level in a patient with a life threatening and time critical injury in the emergency department? To confound this further performance in each of the above instances might also be influenced by the fact that the performer is being assessed or observed. In a hypothetical situation where two individuals have exactly same level of training and performance on a particular skill in a particular context, even then their performance might differ when facing unusual circumstances based on their inherent personality traits.

Competence and competency

The Oxford English Dictionary defines competence as 'an ability to do something successfully or efficiently'. Merriam Webster dictionary also does not differ significantly with this definition. In the clinical context, this could be the ability to make satisfactory and effective decisions or to perform a skill in a specific setting or situation. Competence includes metacognition, because competent individuals are assumed to reflect upon their knowledge, skills and functioning

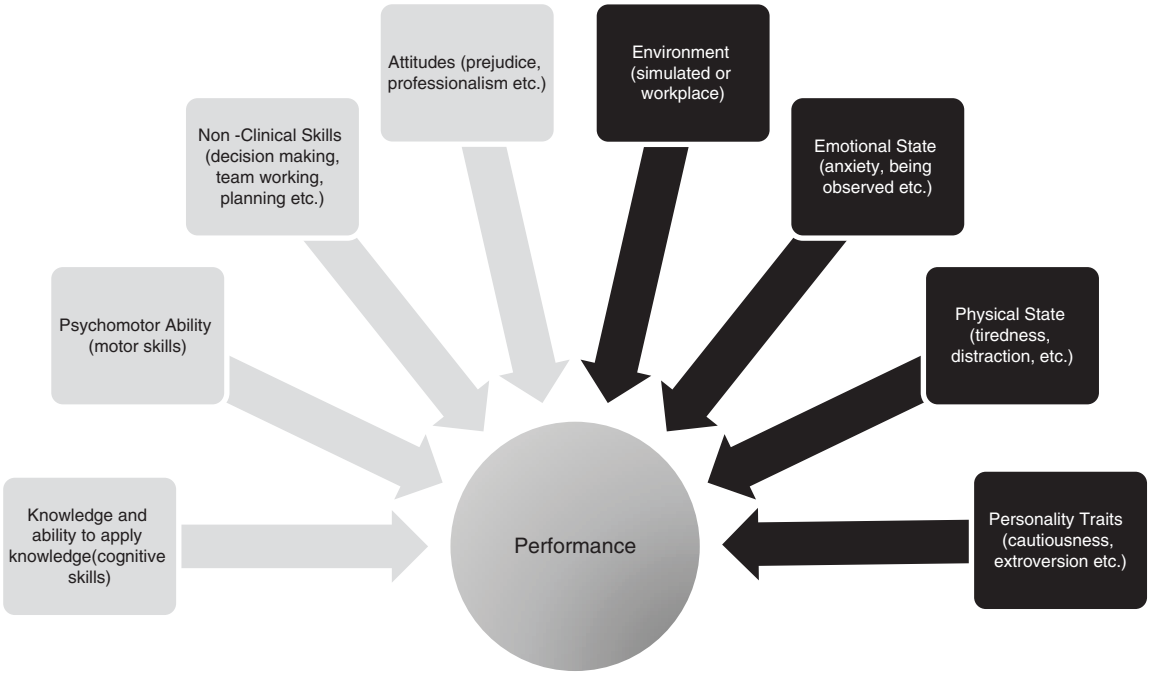

Figure 1. Factors influencing performance.

(Westera 2001). Epstein defines competence in clinical contexts as 'the habitual and judicious use of communication, knowledge, technical skills, clinical reasoning, emotions, values, and reflection in daily practice for the benefit of the individual and community being served' (Epstein & Hundert 2002).

Given that in English language, 'competency' can be used interchangeably with 'competence' (Hager & Gonczi 1996), in medical education and assessment literature, the term 'competency' should strictly be used for the 'skill' itself while competence is the ability to perform that skill and the attribute of the performer. For instance, the skill of insertion of a nasogastric tube is the 'competency' while the person able to perform this has the 'competence' to do this. So an assessment tool designed to test the ability to insert the nasogastric tube is a competency-based assessment tool, which assesses the competence of the person performing it.

Relationship of performance and competence – The Dreyfus model

More than three decades ago, Dreyfus brothers have described a five-stage model of skills acquisition, primarily applicable to pilot training (Dreyfus & Dreyfus 1980). Since then this model has been found applicable to the skills acquisition in various fields including playing chess and driving (Batalden et al. 2002). In the original Dreyfus and Dreyfus model, a learner starts acquiring skills as a novice at one end to achieve expertise on the other (Figure 2).

Towards the lower end of this spectrum, performance is rule-based and non-contextual, while towards the higher end, the performance tends to become fluid and intuitive (Pena 2010). Competence is a point in the middle of this spectrum of improving performance. The exact criteria used to define competence in healthcare would depend on the task in question, particular discipline and context in which the task is being taught or assessed. But in general terms, at the level of competence the individuals have some experience, they are able to make some autonomous decisions but they deal with complexity, based on rules and analysis of the situation.

While there might be some debate in healthcare, how individuals achieve each level of performance on this model and which criteria should be used to define the levels (Carraccio et al. 2008; Pena 2010), still this model has been modified and adapted to explain skills acquisition in nursing (Benner 2001) and medicine (Carraccio et al. 2008; Holmboe & Hawkins 2008; ten Cate et al. 2010). This model clearly indicates that skills acquisition is an ongoing process which ranges from novice to expert. Individuals use optimal training, deliberate professional practice and extended domain-related activities to incrementally improve their performance (Ericsson et al. 2006). ten Cate (2010) argues that individuals reach the level of competence on this spectrum by training and reach the levels of proficiency and expertise by deliberate practice (Figure 3).

If 'Training' is defined as a process of acquisition of new skills or components of skills taught by others and 'Deliberate Practice' as self-directed rehearsal, facilitated or un-facilitated by tutors, but leading to refinement of skills then we would argue that; demarcation of a point by ten Cate beyond which further training could not help in skills acquisition is completely arbitrary. As training and deliberate practice are not mutually exclusive and individuals can use both of these together at any point on the skills acquisition curve to improve their performance. At the same time, we recognise that training could be a less prominent feature compared to deliberate practice towards the higher end of skills acquisition, but the contrary might not be essentially true, as novices can use training and deliberate practice together to refine their skills. Training will move them from the level of incompetence to novice, and from this point onwards they can use both training and deliberate practice to improve their skills. Further, we would like to add two points on the original Dreyfus model, one each at the bottom and the top of the spectrum. In our view, the spectrum should range from 'Incompetent' below the novice level to 'Master' above the expert level. The addition of

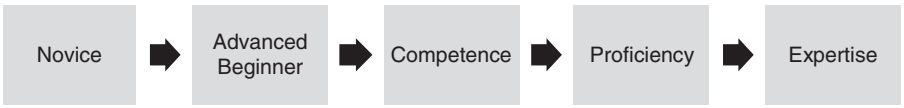

Figure 2. Spectrum of skills acquisition (Dreyfus & Dreyfus 1980).

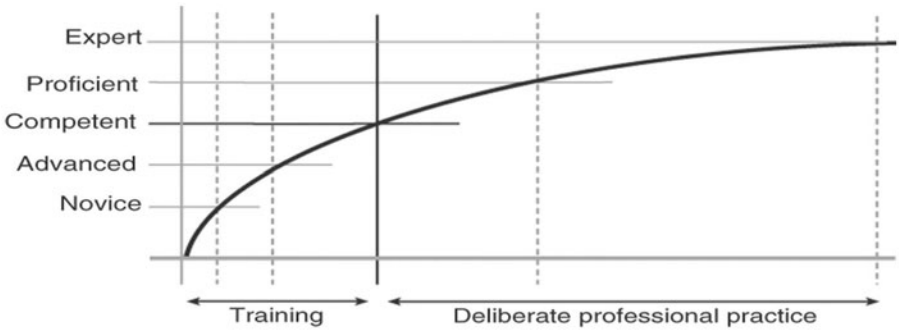

Figure 3. General curve of skills acquisition reproduced from ten Cate (2010).

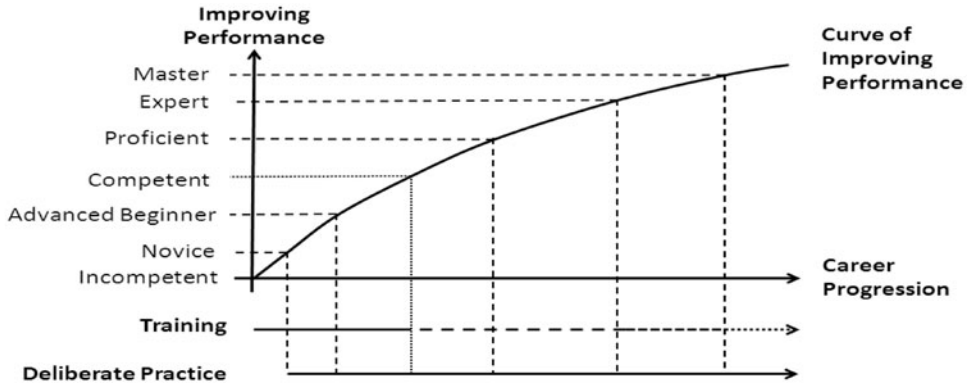

Figure 4. Curve of improving performance adapted for healthcare – modified from Dreyfus and Dreyfus (1980) and ten Cate et al. (2010).

'Incompetent' level is important as starting from 'Novice' implies that every individual is able to perform every skill albeit at a beginner level. In fact, most skills are learnt by individuals who are unable to perform these prior to that point.

Carraccio (2008) has also described a modification of the original Dreyfus model including mastery at the top. Such addition of another level above expertise also fits in very well with the model for assessment which is described later in this article. It is also extremely important to recognise that mastery at the top of this spectrum should not be considered as absolute and these individuals could still constantly improve their level of performance by reflection and rehearsal. At what point the curve of improving performance completely flats out, if at all, is not known to us at this time (Figure 4).

In Figure 4, the points at which each level of performance intersects *X*- and *Y*-axes are completely arbitrary. These points will vary from person to person and skill to skill. Also individuals will not achieve every competency required of them at the same time in their career progression. Peers could also differ in their position on this curve and might be able to perform at, above or below the expected level of performance.

In the context of healthcare, Carraccio (2008) has assigned certain attributes to each of the levels on the Dreyfus model. These attributes roughly map to the five levels of entrustment described by ten Cate (2010). We would like to assign attributes to our modified Dreyfus model, these attributes have some differences to what Carraccio (2008) has described especially at the expert and master level. We have further shown the relationship of each of these levels to the training and supervision requirements and to the levels of entrustment described by ten Cate (2010). The purpose of Table 1 is not to conclusively assign these attributes, as more work will be needed in this area in the future to have a consensus, if needed at all. It is also likely that training programmes decide on a different set of attributes for each of these levels, as applicable to their education and training system. Table 1 should be seen as an example, which is included for the sake of completeness rather than conclusiveness.

The above discussion categorically refutes the common belief propagated by a large body of published literature (Gorter et al. 2002; Rethans et al. 2002; Ruedy 2007; Boursicot et al. 2011) that assessment of competence and assessment of performance are separate from each other. Instead it clarifies that competence is the ability to perform at a certain level, rather than a separate domain from performance. This notion that competence and performance are not separate from each other is also supported by Burg (1982) stating that, '. . . it is performance that must be measured to assess the attribute competence in a performer'.

Even though the consensus statement quoting Ram et al. (1999a) says that competence and performance should not be seen as opposing entities as these are part of a spectrum on a continuous scale, the statement treats these two as completely separate domains (Boursicot et al. 2011). For instance, Objective Structured Clinical Examinations (OSCEs) are described as a tool used to assess competence and work-place-based assessment tools (WPBAs) like Direct Observation of Procedural Skills (DOPS), Mini Clinical Examination (Mini-CEX), etc. are said to assess performance in clinical environments. Based on the earlier discussion, both of the above are assessments of performance, the former in the simulated settings and the latter in the workplace, as described in detail below.

Miller's pyramid in relation to the assessment of performance – A critique

The confusion that competence and performance are different domains has been partly created by over-simplistic application of the principles described by Miller (1990) to the complex assessment tools (Figure 5).

Miller has classified 'does' as action and 'shows how' as performance (Miller 1990). We would challenge this notion and classify both 'does' and 'shows how' as performance, the former as actual performance (AP) in workplace and the latter as demonstrated performance for assessment purposes whether in the workplace or in the simulated settings. Still Miller's original description is closer to reality and logic compared to how it is being interpreted today, where 'does' has become performance and 'shows how' competence (Boursicot et al. 2011). Such representation implies that when candidates are asked to perform a skill to demonstrate

Table 1. Attributes of levels of performance in the context of healthcare – modified from professional standards for conservation, Institute of Conservation (London) 2003, web source (accessed March 2012).

Level of performance	Attributes of performer (looking at overall performance encompassing simple tasks, routine and non-routine complex tasks)	Supervision or training requirements	Relationship to the level of entrustment as described by ten Cate (2010)
Incompetent	Unable to perform	Training and supervision needed to move up to the novice level	Level 1
Novice	Rules (protocol)-based performance Unable to deal with complexity Task seen in isolation	Direct supervision needed at all times	Level 1
Advanced beginner	Guidelines-based performance Able to achieve partial resolution of complex tasks	Able to perform routine tasks under indirect supervision	Level II
	Task seen as a series of steps	Direct supervision needed for complex tasks only	Level I
Competent	Performance not solely based on rules and guidelines but also on previous experience Able to deal with complexity with analysis and planning	Able to perform routine complex tasks	Level III for routine complex tasks
	Task seen as one construct	Training and supervision needed for non-routine complex tasks	Level II for non-routine complex tasks
Proficient	Performance mostly based on experience Able to perform on acceptable standards routinely Able to deal with complexity analytically	Still needing supervision for non-routine complex tasks	Level IV for routine complex tasks and Levels III–IV for non-routine complex tasks
	Related options also seen beyond the given task	Able to train and supervise others performing routine complex tasks	
Expert	Performance based on experience and intuition Achieves excellent performance In complex situations moves easily between analytical and intuitive solutions All options related to the given task are considered	Able to train and supervise others performing routine and non-routine complex tasks	Level V
Master	Performance becomes a reflex in most common situations Sets new standards of performance Mostly deals with complex situations intuitively Has a unique vision of what may be possible related to the given task	Able to train other experts at national or international level	Level V

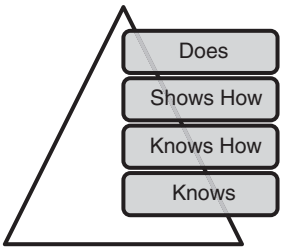

Figure 5. Miller's pyramid (Miller 1990).

their competence, it falls in the 'shows how' category and classed as 'Competence Assessment' as in the case of OSCEs. This model further implies that when we use tools like DOPS or Mini-CEX, we assess individuals' performance, and not their competence, as competence is defined as 'able to do' and performance as 'actually does' (Ruedy 2007; Boursicot et al. 2011). The consensus statement on performance in assessment classes WPBAs as tools capable of assessing both at the level of 'shows how' and 'does', on the Miller's pyramid (Boursicot et al. 2011). Dreyfus and Dreyfus (1986) have stated that any knowledge of being a part of an experiment changes the behaviour; this can seamlessly be extrapolated to being observed during an assessment. Hence, it becomes a strong argument to refute that any assessments where candidates are aware that they are being observed, reflect their AP. Some of the key flaws of simplistic application of the Miller's pyramid to the assessment of performance are discussed below.

Firstly, the notion that WPBAs can assess both at the 'shows how' and 'does' fudges these two levels. These are separate levels and different assessment tools are available to assess each one of these. To elaborate this further, if a DOPS tool is used to assess, it is directly observed by an assessor while the competencies are being demonstrated by the candidate. Even the video-based assessment of performance captures the candidates' ability to demonstrate their competence or the ability to show how they would perform a skill and a bias would exist due to the mere fact that the candidates are aware of being assessed.

On the contrary, if unidentifiable incognito patients (who are trained assessors) are used for the assessment of AP in the workplace this bias will be removed and AP could then be captured. Such an assessment will map more accurately to the 'does' level on Miller's pyramid (Gorter et al. 2002).

Secondly, the notion that tools used at 'shows how' level assess competence and tools used at the 'does' level assess performance is also misleading. As described earlier based on the work of Dreyfus and Dreyfus (1986), competence is a point on the spectrum of performance not a separate entity. Hence, it could be assessed by any tool that assesses performance both at 'shows how' and 'does' levels.

Thirdly, this model does not clarify that if a candidate is unable to 'show how' in an artificial simulated environment, it does not strictly translate into an inability to perform a task observed or unobserved in the workplace. For instance, inability to cannulate a plastic venepuncture model could be due to lack of fidelity of the model and not necessarily due to lack of skills of the performer. In other words, there is no definite and clear hierarchical relationship between 'shows how' and 'does' in some situations.

Fourthly, this model also implies that if a candidate demonstrates the ability to perform a skill or a task successfully, it is generic and they will be deemed competent in that task irrespective of the context. ten Cate (2010) also highlights the same problem that the current models do not take into account the relationship of competencies and the context of practice. While there is strong evidence in the literature (van der Vleuten & Schuwirth 2005; ten Cate et al. 2010) that competence (performance) is not a stable construct and the ability to perform a skill in a plastic dummy is different from performing the same skill in a real patient as explained earlier.

Finally, this model does not explicitly make it clear that 'shows how' is a composite of the 'knows' and 'knows how' levels at the base of the pyramid, i.e. an individual would first need to have the knowledge, then the cognitive ability to apply the knowledge in order to be able to demonstrate that they can perform the skill.

Discussion – New model of performance assessment

The way the terminology with 'competence' and 'assessment of competence and performance' has been in use so far is not only at odds with relationship of competence and performance described by Dreyfus (1986) and Carraccio (2008) and the model proposed in this article, but also with the common use of English language. If a doctor has passed an assessment of competence they can be called, a competent doctor (in that particular area). What would they be called if they passed an assessment of performance – a performing doctor!

On the contrary to the common notion that the ability to do something while being observed or assessed in the workplace (using WPBAs) is an assessment of performance and in the OSCE circuit is an assessment of competence – both of these should be seen as assessment of 'performance'. The former should be called as 'Observed Performance in Workplace Settings' or OPWS and the latter 'Observed Performance in Simulated Settings' or OPSS, bearing in mind that both of the above are 'Competency-Based Assessments' and assess the 'performance' of the candidates in different settings or environments under the influence of different factors. This concept is supported by the statement in Hager's (1996) paper that all 'competency-based assessments centre on performance'. The logical inference from this will be that the level of performance demonstrated in the simulated settings might not automatically translate into the same level of performance at the workplace. An individual might have different levels of performance in different environments on the same skill, as discussed in detail earlier.

The AP can only be assessed when the candidates are unaware of being observed or assessed. One tool currently available to achieve this is the use of 'incognito patients' (Gorter et al. 2002). The General Medical Council in the UK describes case-based discussions (CBDs) as a means of (actual) performance assessment. This is only possible when the doctors are not allowed to choose the cases for discussion, rather these are chosen randomly from their previous case loads. Unfortunately, the way CBDs are currently being used, allowing the trainees to choose which cases they would like to bring to discussion does not fall into assessment of AP, rather fits in better with the OPWS. The other caveat of the use of CBDs for the assessment of performance is that it does not allow the assessors to directly observe procedural, communication or examination skills of the candidates. This new model of assessment of performance is depicted in Figure 6.

Application of this model to the rating scales

This model of assessment will allow the continuation of the use of the available assessment tools with the added clarity about the context or environment in which the performance is being assessed, this is in-line with the model of EPA's proposed by ten Cate (2010). Further, the application of the modified Dreyfus model will allow developing scoring rubrics to record the level of performance being demonstrated by the candidates during the assessments in simulated environments, workplace or by the use of incognito patients. Such a model of assessment will also allow ranking candidates as incompetent, novice, advanced beginner, competent, proficient, expert or masters. Ranking against these levels on the Dreyfus model will be made possible when attributes and observable behaviours are assigned to each of these levels, for particular skills in different specialities. It is important to bear in mind that the observable behaviour in the management of acute severe asthma would differ between a medical trainee and an anaesthetic trainee at each level of performance, because of variation in the skills learnt in each speciality. This will not only clarify the outcomes of the assessments, but also help to move away from the mediocrity towards which we are pushing our young doctors to achieve competence alone in order to be able to progress. This mediocrity is the end result of the way the skills are assessed using the current WPBA tools, deeming them either competent or incompetent with no driver or incentive for them to achieve expertise or mastery levels in any of the skills being assessed. The current scoring rubrics do not define the exact levels of performance expected of

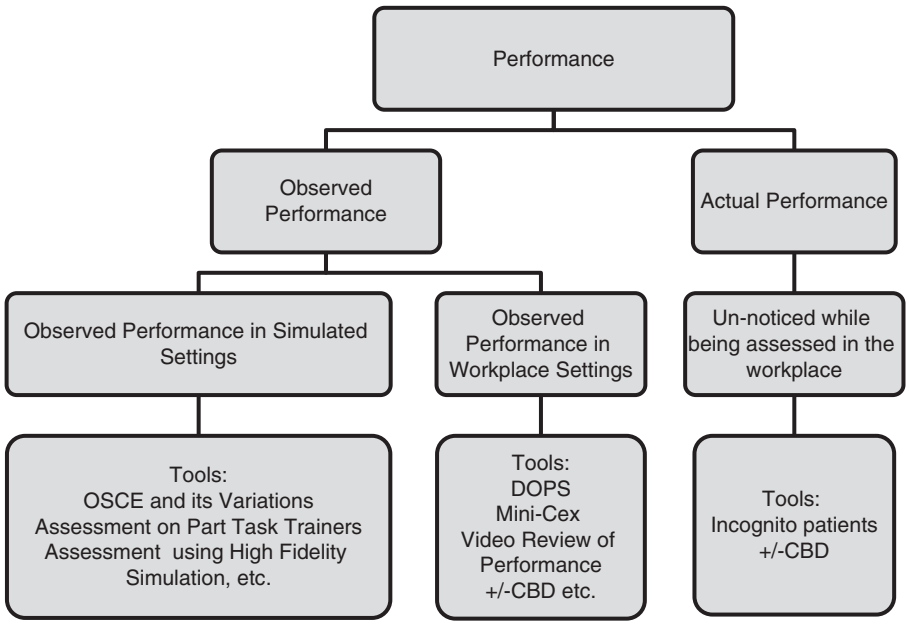

Figure 6. Model for the assessment of performance and examples of available assessment tools (CBD – please see text for explanation).

the candidates. This results in the examiners comparing the performance of candidates rather than scoring them against concrete criteria. The adaption of the model proposed in this article will allow scoring the candidates against explicit observable behaviours.

Hence we propose that all 'competency-based assessments' should be called 'competency-based assessments of performance' and performance rating scales (PRSs) should be developed and used with these. Such holistic scales should incorporate anchors based on the modified Dreyfus model to record the level of performance rather than a dichotomous decision of being competent or incompetent. Further along a particular marking grid for the performance spectrum, cut-off points could be set for passing each level of training as the candidates progress through their careers. For instance, a foundation doctor should be able to pass the history-taking skills at the advanced beginner level but a senior registrar should achieve a proficient or expert to pass the same skill in the same context using an identical marking tool. Such benchmarking will further allow the candidates to track their progress based around the required competencies. An example scoring rubric is shown in Figure 7.

Such a model is also supported by Burg's (1982) work where he has used 'competence' interchangeably with 'performance' while stating; 'A comprehensive definition of competence would outline the abilities required of the student or physician at each level of professional development as he or she progresses through the continuum of medical education'.

The limitations of the above PRS as an example, are its specificity to postgraduate training, with respect to certain skills most fresh medical graduates will enter this spectrum at a 'novice' or 'advanced beginner' level instead of 'incompetent'. History taking will be an example where the students would be expected to perform at 'advanced beginner' level at graduation. Insertion of a dialysis catheter used above as an example could be a skill we would not expect the medical students to learn until after their graduation and start of clinical practice in a relevant speciality, hence the students will enter the spectrum at 'incompetent' level. There is no reason why a similar PRS cannot be used during the undergraduate training of medical students. Again there will be a need to define the expected outcomes according to their year groups in the medical schools for particular skills. We would envisage that for common skills like clinical examination of organ systems, communication, etc. the outcomes by year five would be somewhere at the level of 'novice' to advanced beginner' depending on how each of these levels is described in a given programme. Further, the same PRS then should be used in the postgraduate training for that skill in question to track their progress to the 'expert' or 'master' levels, in the years to come.

The use of such a model will allow having a universal scoring rubric, with anchors for each level, e.g. proficiency, expertise, etc. adapted to training programmes, curricula, expected outcomes and healthcare systems of individual states or countries. The candidates would be able to demonstrate performance at a higher or lower level of their training to what might be expected of them, in particular environments. Individual trainees might achieve different levels of performance at a given point in time. A particularly useful application of this model will be for the assessment of performance for equivalence purposes when candidates at various grades move from one country to another.

Conclusions

The performance of an individual is application of his or her knowledge, skills and attitudes, and the interplay with the practice settings (ten Cate et al. 2010). The level of performance varies when the clinical scenarios change and the individuals apply skills accordingly. Based on the above discussion, we would like to propose that competency is the 'skill' and 'competence' is an attribute of a person. Further,

Proposed Performance Rating Scale

Please grade the candidate's performance at one of the above levels

(The description of the observable behaviours for this particular skill should be provided separately to the assessors for each level described above)

Grade of Candidate:

e.g. Foundation Year or Specialist Trainee

Assessment Tool Used:

e.g. DOPS, OSCE or Incognito Patient etc.

Type of Performance:

e.g. AP, OPWS or OPSS

Skills Being Assessed:

e.g. History Taking or Clinical Examination of Chest

Influencing Factors:

e.g. Under Stress or Fatigue etc.

Free Text Feedback:

Figure 7. Proposed performance rating scale for postgraduate doctors for a skill which is not expected to be learnt as a medical student.

competence is a point on the performance spectrum. All 'competency-based assessments' should be called 'competency-based assessment of performance'. Such assessments could be used to measure AP (unobserved and natural) in the workplace and observed performance (influenced by the presence of assessor) in either simulated environments or workplace. AP can be assessed by incognito patients and possibly CBDs while observed performance can be assessed in simulated environments by using OSCEs or workplace by using WPBA tools. PRSs with anchors based on modified Dreyfus model and appropriate cut-off points could be used with all 'competency-based assessment of performance' tools. Such rating scales would allow benchmarking of performance in particular environments and allow the candidates to track their performance over the years of training. The next stream of work in the field of assessment of performance should focus on the critique of the model we have proposed and its practical applications in the workplace.

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