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Applying Sport Psychology to Improve Clinical Performance

Abstract

Preparedness for practice has become an international theme within Medical Education: For healthcare systems to maintain their highest clinical standards, junior doctors must 'hit the ground running' on beginning work. Despite demonstrating logical, structured assessment and management plans during their undergraduate examinations, many newly-qualified doctors report difficulty in translating this theoretical knowledge into the real clinical environment.

'Preparedness' must constitute more than the knowledge and skills acquired during Medical School. Complexities of the clinical environment overwhelm some junior doctors, who acknowledge they lack strategies to manage their anxieties, under-confidence and low self-efficacy. If uncontrolled, such negative emotions and behaviours may impede the delivery of time-critical treatment for acutely unwell patients and compound junior doctors' self-doubt, thus impacting future patient encounters.

Medical Education often seeks inspiration from other industries for potential solutions to challenges. To address 'preparedness for practice' this AMEE guide references sport psychology: Elite sportspeople train both physically and psychologically for their discipline. The latter promotes management of negative emotions, distractions and under-confidence, thus optimising performance despite immense pressures of career-defining moments. Similar techniques might allow junior doctors to optimise patient care, especially within stressful situations.

This AMEE guide introduces the novel conceptual model, PERFORM, which targets the challenges faced by junior doctors on graduation. The model applies Pre-Performance Routines from sport psychology with the self-regulatory processes of metacognition to the clinical context. This model could potentially equip junior doctors, and other healthcare professionals facing similar challenges, with strategies to optimise clinical care under the most difficult circumstances.

Introduction

The world of healthcare is complex and invokes cognitive, affective, motivational and physical pressures on individuals. Despite this, individuals must perform to the highest standard to deliver effective patient care.

Our guide is motivated by experiences of supporting junior doctors in the complex real-life world of healthcare. However, senior doctors and other healthcare professionals endure similar challenges, (Suresh et al., 2013, Rudman et al., 2014) and therefore our model is applicable to any group which may benefit from its implementation.

Sport and healthcare share many similarities: Both can be busy, distraction-filled environments where optimal self-efficacy and anxiety management are integral to success (Hazell et al., 2014). Athletes achieve optimal performance despite such pressures using strategies such as Pre-Performance Routines (PPRs),(Cotterill, 2010). Utilising the success of PPRs in sport, this guide outlines their transformation into Performance Enhancing Routines (PERs) to optimise clinical performance.

This AMEE guide presents the truly collaborative and novel conceptual model developed by medical educators and a sport psychologist. Firstly, challenges faced by junior doctors in the clinical environment and the literature regarding preparedness for practice are outlined. A short review summarises optimisation strategies used in sport before metacognition, and its current implementation in both disciplines, is described. The PERFORM model is presented, its applicability demonstrated using clinical examples concludes the guide.

Challenges within Healthcare

Patient safety concerns regarding sub-optimal management of acutely unwell patients cite junior doctor's working patterns as a serious contributor (Massey et al., 2009; Quirke et al., 2011): Both the European Working Time Directive (EWTD) and the frequency of rotations through different specialities limit doctors' clinical exposure to acutely unwell patients, thereby decreasing experiential learning opportunities (Cullinane et al., 2005). Shift patterns increase the frequency of hand-overs, allowing more opportunities for tasks to 'slip through the net' and be inadvertently overlooked, especially when the urgency of the task is not adequately communicated (NPSA, 2007). When out-of-hours shifts commence, decreased staff numbers create a bottleneck of outstanding tasks and despite optimum efficiency the time to attend to patients will increase. All of these factors are compounded by the complexity of patients with multiple co-morbidities (Massey et al., 2009), and junior doctors' heavy workloads (Quirke et al., 2011) in an environment often lacking senior clinical support (Smith et al., 2013).

Healthcare as a Complex Environment

Medicine is complex, encompassing many different areas of health. The patient's history, examination-findings and investigation results yield potentially hundreds of pieces of clinical data which must be analysed to reach a working diagnosis. Medicine's dynamic nature compounds this complexity, with the ever-expanding knowledge base of diseases and their management. Co-morbidities cause acute-illness presentation to be muddied by the waters of pre-existing pathology, and their increasing prevalence is partly due to an ageing population (Bion and Heffner, 2004), hence the time taken to manage a patient's presenting complaint in the Emergency Department is proportional to their age (George et al., 2006).

Environmental factors cannot be ignored: The increasing patient: doctor ratios in hospital (Cullinane et al., 2005) requires medical staff to deliver patient care over more clinical environments, many of which are unfamiliar. Variations in ward-layout, equipment storage and nursing-staff levels (Cutler, 2002) cause additional stress during patient management. Junior doctors require resilience to navigate these complex, error-prone healthcare environments (Kjeldstadli et al., 2006), thus acquiring strategies to control their anxieties and optimise focus may improve patient care.

Factors contributing to sub-optimal care of the acutely unwell include patient complexity, clinical environments and education,(Quirke et al., 2011). When considering targets for improvement, patient factors are difficult to control and the environment and workforce are large-scale, slow-moving variables. Education is the most realistic target for intervention to empower healthcare staff and improve healthcare provision on the front-line.

An Unprepared Workforce

Given the complexities of healthcare, it is unsurprising that a significant proportion of medical students feel unprepared to become doctors. This global problem seems independent of organisational variables, with similar reports from the UK (Goldacre et al., 2014), Germany (Ochsmann et al., 2011) and America (Hall et al., 2011).

In hospitals, doctors are interrupted on average every 11 minutes, the highest interruption frequency occurring in clinical areas accommodating the most unwell patients, e.g. Intensive Care Units (Weigl et al., 2011). Distractions cause adverse outcomes (Thomas et al., 2015) including prescribing errors (Li et al., 2012) and impaired procedural skills (Moorthy et al., 2003). Although medical students have been taught distraction handling techniques in simulation with promising results, (Thomas et al., 2015, Ford et al., 2016) they have not been applied to junior doctors navigating the complexities of hospital environments.

Occupational uncertainty and under-confidence can cause stress, anger and frustration. In a survey one third of doctors acknowledged that stress-related symptoms affected their patient management,(Firth-Cozens and Greenhalgh, 1997): Sixty percent of these produced lower standards of care including serious, and in two cases fatal, mistakes. There are significant consequences when stressors are not effectively managed.

Self-efficacy is a key target to decrease environmental tensions as when optimised, it increases motivation and job satisfaction (Sadri and Robertson, 1993), thus lowering workplace stress (Kushnir et al., 2000). Self-efficacy is defined as “people's beliefs about their capabilities to produce designated levels of performance that exercise influence over events that affect their lives”, determining how people “feel, think, motivate themselves and behave” (Bandura, 1994, page 71). High self-efficacy increases the likelihood for success as tasks are perceived as achievable challenges, whereas lower efficacy-beliefs cause decreased efforts during difficultly, further eroding one’s capability beliefs. Self-efficacy is vulnerable when commencing learning processes (Kaufman, 2003), and must be optimised at the beginning of junior doctors’ careers to enhance performance and decrease psychological tensions.

The literature lacks evidence of training initiatives targeting awareness and resolution of environmental stressors when managing acutely unwell patients (Church et al., 2016). The closest example of this is the use of “diagnostic pauses” in General Practice (Atkinson et al., 2011), which the doctor initiates at common, scheduled moments, e.g. during hand-washing, to evaluate consultation progression. This strategy invokes metacognition to review, evaluate and implement change to reach the desired consultation outcome.

Medical students demonstrate the skills and knowledge to treat acutely unwell patients, but on graduation report feeling unable to apply these in the real-life clinical context,(Tallentire et al., 2011). They lack strategies to manage the complexities of the clinical environment (Ford et al., 2016); often feeling paralysed by stress when managing acutely ill patients,(Tallentire et al., 2011). Such overwhelming emotion will likely reduce focus, impair clinical performance and increase errors.

Features of competitive sport performance similar to medicine

Approaches from other industries have often been explored to address medical educational challenges, for example aviation (Toff, 2010). However, this comparison has been scrutinised (Randell, 2003), citing differences in the complexities and fluidity of the two industries (Buck). Sport is a possible area from which fresh ideas could be generated due to the shared need for performance optimisation in complex, unpredictable environments. Sport involves rapid fluidity in information-load from one moment to the next (Gallucci, 2013), and multiple distractions through opponents' behaviours, audiences and coaches shouting from the side-lines. Compare this with the medical model of rapid patient assessment in whilst answering pagers and being interrupted with requests to complete unrelated tasks.

Insights from Sports Psychology: Pre-Performance Routines

Sport performers contend with multiple distractions during whilst executing complex motor skills. A common approach to enhance skill preparation is the use of Pre-Performance Routines (PPRs). These are defined as "a sequence of task-relevant thoughts and actions which an athlete engages in systematically prior to his or her performance of a specific sports skill" (Moran, 1996, page 177). Although PPRs aim to optimise competitive performance, they are typically developed during training sessions.

A PPR for a tennis player prior to their serve might include the following sequence of preparatory thoughts and actions:

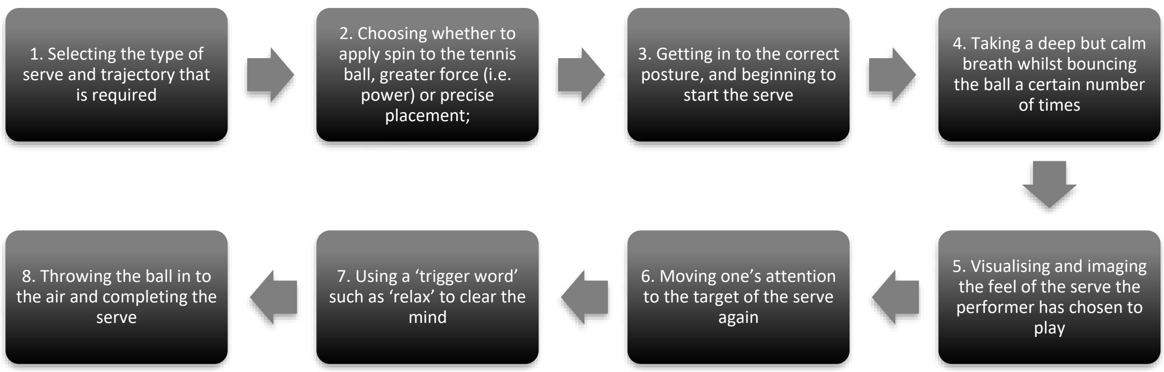


Figure 1: An example of a PPR for a tennis player immediately before their serve (Adapted from Moran, 2000)

The step-by-step PPR in Figure 1 highlights their bespoke nature. Specific thoughts and actions may be required for different individuals completing specific tasks (Cotterill, 2015). A variety of PPRs are evident in the sport psychology literature which facilitate desirable task behaviours, and in turn, performance.

Functions of Pre-Performance Routines

Attentional Focus and Reducing Distraction. Despite multiple distractions, athletes must concentrate on the 'here and now'. PPRs, such as self-talk and visualisation, can prevent focus on task irrelevant concerns (Crews and Boutcher, 1986) and also direct attention away from a series of automated movements (Moran, 1996) which unravels if 'over-thought' (Beilock et al., 2002). A routine's duration is often proportional to task difficulty (Jackson & Baker 2001) for example, simply taking a deep breath might regain focus quickly during competition (Cotterill, 2015).

Regulating Arousal and Emotional States. Sport performers who have a developed a range of PPRs are less likely to rush the execution of a task under pressure. This "escapist" behaviour results from undesirable physiological and psychological symptoms prior to skill-execution, and lowers success rates (Jordet, 2009). A PPR applied here can redirect attention away from uncomfortable symptoms to the task at hand (Marlow et al., 1998).

Self-Efficacy Beliefs and Perceptions of Control. Prior to task execution, self-efficacy influences one's interpretation of their physiological and affective state in both sport and medicine (Hanton et al., 2004, Cleary et al., 2015). Having a range of PPRs from which to select increases one's sense of control, minimising anxiety in pressured situations (Boutcher, 1992).

Effectiveness of Pre-Performance Routines

PPRs are utilised in a wide range of discrete motor skills in sport, including golf swing or putt; a basketball free throw; and penalty shots. PPRs are predominantly used in self-paced skills which have a defined beginning and end (Cotterill, 2010), but are also applicable to more complex, dynamic tasks, such as skiing, skating and dancing (For a review, see Cotterill, 2010).

Successful translation of routines from discrete to complex tasks relies on the athlete's ability to self-regulate their use: Learning to assess the situation, choose the most appropriate PPR, implement and evaluate its success aligns with Metacognition, which has already been highlighted in recent literature regarding performance optimisation in sport (MacIntyre et al., 2014).

Metacognition

Metacognition, or "thinking about thinking", is a psychological concept explaining how individuals monitor and regulate their cognitive efforts (Flavell, 1979) and contains the facets of Metacognitive Knowledge, Experiences and Skills, which were originally described by Efklides, (2008):

1. **Metacognitive knowledge** is an ever-evolving memory bank which influences the course of a cognitive task. Flavell (1979) originally described three components; person, task and strategy: *Person* encompasses beliefs about one's own or others' cognitive ability. *Task* includes analysis of available information and the perceived level of difficultly; thus, inferring the likelihood of

successful completion (i.e. 'self-efficacy'). Metacognitive *strategies* are methods through which the challenge is approached.

2. **Metacognitive experiences** are those a person is aware of during a task (Efklides, 2006). They include *metacognitive feelings*, the emotional responses surrounding a task, which can be positive e.g. subject familiarisation, or negative e.g. task difficultly. *Metacognitive judgements* analyses task progression, time required for completion and likelihood of success. Metacognitive experiences are influenced by, and refine metacognitive knowledge by adding, deleting or revising its contents (Flavell, 1979).

3. **Metacognitive skills** control and regulate cognitive strategies to achieve desired performance (Efklides, 2008). These "executive functions" described by Brown (1987) in Efklides (2008) include:

1. Planning: appropriate strategy selection and allocation of resources for task performance.

2. Monitoring of the task requirements.

3. Evaluation of the completed task and efficiency with which it was performed, including appraising strategies that were used.

During a task, metacognition both monitors and controls. Metacognitive knowledge and experiences monitor how a task is being performed, whereas metacognitive skills implement control (Efklides, 2006).

The Use of Metacognition in Sports

Metacognitive processes have been linked to effective cognitive control in elite endurance (Brick et al., 2015) and middle-distance (Nietfeld, 2003) runners. Metacognitive skills allow application of strategies to focus, maintain motivation and monitor physiological processes to inform tactics during competition.

Applying Metacognition to Performance Enhancing Routines (PERs)

Effective PPR use depends on the athlete's ability to self-regulate their skills with varying task demands (Singer, 1988, Moran, 1996). Despite its key role in self-regulation, metacognition's contribution to PPR regulation has been largely overlooked. Research examining athletes' metacognitive processes *and* self-regulation in unison is in its preliminary stages (MacIntyre et al., 2014, Brick et al., 2015), and their separate examination in sport has a number of limitations regarding performance enhancement to which Medical Education can contribute.

Firstly, there are theoretical inadequacies in explaining *how* performers regulate their thoughts and behaviours during performance. Some PPR development models apply aspects of self-regulation theory insofar as evaluating and adjusting one's skills after execution (Singer, 1988). However, a more comprehensive model underpinned by self-regulation *and* metacognition would provide stronger theoretical justification and a clearer guide for implementation. This has strong potential to inform clinical performance optimisation and, due to its generalisability, other contexts such as post-graduate examinations or extra-curricular activities.

Future research exploring metacognition in PER development needs to develop a model explaining how individuals regulate their use of routines. Tasks should be conceptualised as dynamic, ever changing processes upon which the metacognitive monitoring cycle is superimposed to inform PPR implementation.

The Application of Metacognition in Medicine

Metacognitive strategies have been highlighted across many clinical and educational areas. "Diagnostic pauses" (Atkinson et al., 2011) are similar to PPRs in the context of closed, self-paced skills where athletes invoke their routine at a prescribed moment. What is absent from the Medical Education literature is a fluid model, applicable to more complex circumstances akin to the open skills of team-based sports and acute clinical scenarios. For clinicians, this would involve an over-arching model of awareness throughout a patient encounter, mirroring a 'reflection in action' culture (Schön, 1983) with monitoring, evaluation and strategies afforded by metacognition.

In secondary care, metacognition has been highlighted in educational interventions including diagnostic reasoning (Croskerry, 2003) and communication (Falcone et al., 2014). One American study used metacognition to teach cognitive error reduction in simulation,(Bond et al., 2004): Whilst this study demonstrated that metacognitive strategies can be taught, the participant's acknowledgement varied according to their experience, with increased awareness of cognitive forcing strategies by senior clinicians, and more clinically-focussed assertions expressed by junior participants.

Metacognition as a future target for healthcare education

The literature demonstrates an interest and willingness to adopt metacognition into Medical Education. The range of contexts in which it has been applied demonstrates the flexibility of the theory, but clear guidance on implementation of metacognitive strategies in the clinical environment is lacking. Sport psychology may offer practical advice to educationalists wishing to implement metacognitive techniques into clinical teaching.

Performance Enhancing Routines For Optimising Readiness using Metacognition.

As the literature has failed to offer solutions to the challenges faced by junior doctors when managing acutely unwell patients in the complex clinical environment, new initiatives must be generated. Our novel conceptual model, PERFORM, transforms PPRs from sport psychology into Performance Enhancing Routines (PERs) using the regulatory processes of metacognition, which has already attracted much interest in both sport (Brick et al., 2015) and medicine for performance optimisation. This model will become the foundation of an intervention aiming to optimise junior doctors' management of acutely unwell patients.

The PERFORM model (Figure 2) illustrates the regulation of PERs using the metacognitive facets described by Efklides,(2008). Figure 3 demonstrates the contextual model where the task (central circle) is surrounded by environmental pressures (arrows) within the complex clinical environment (graduated grey background).

Figure 2: Conceptual PERFORM model

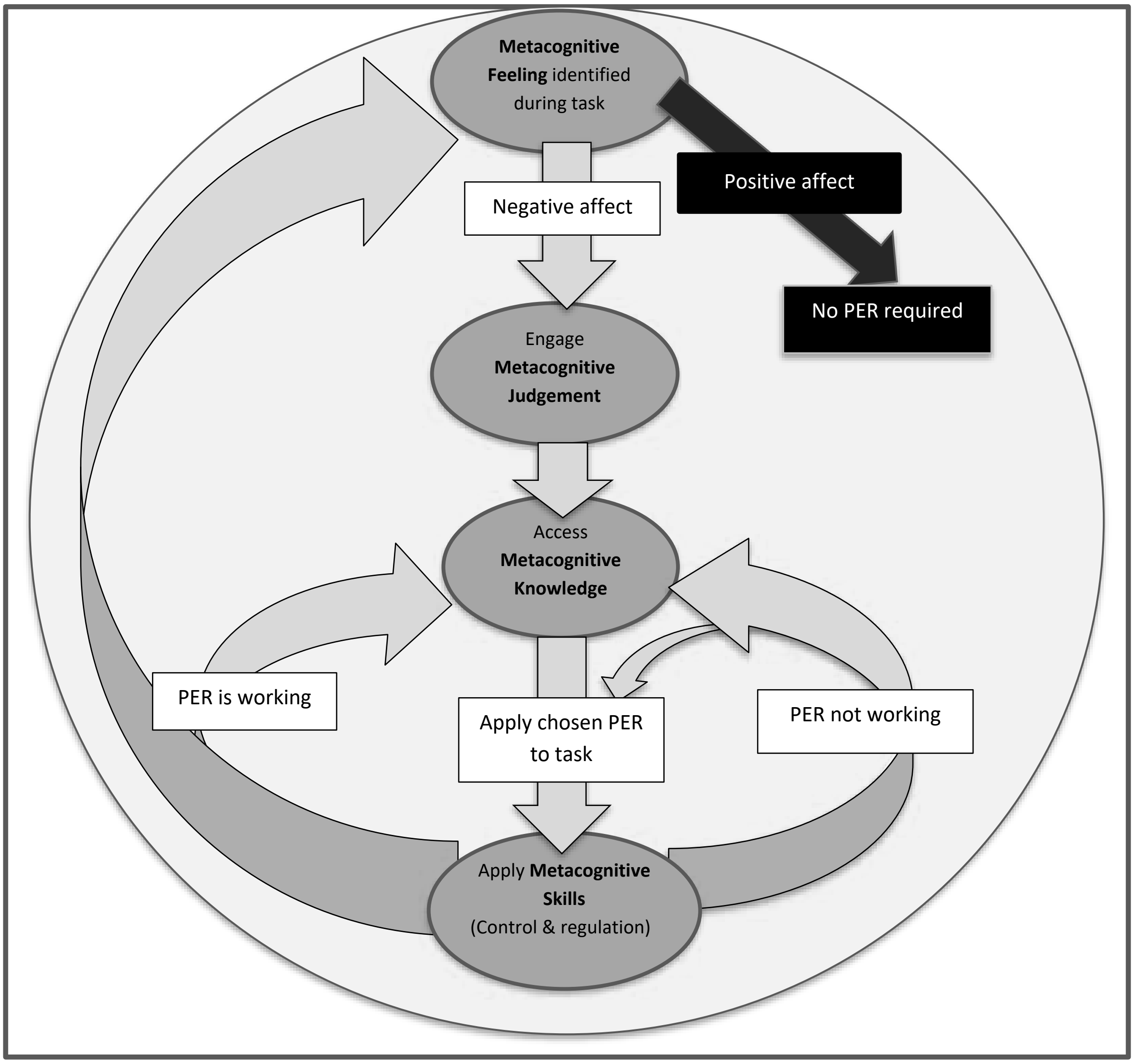
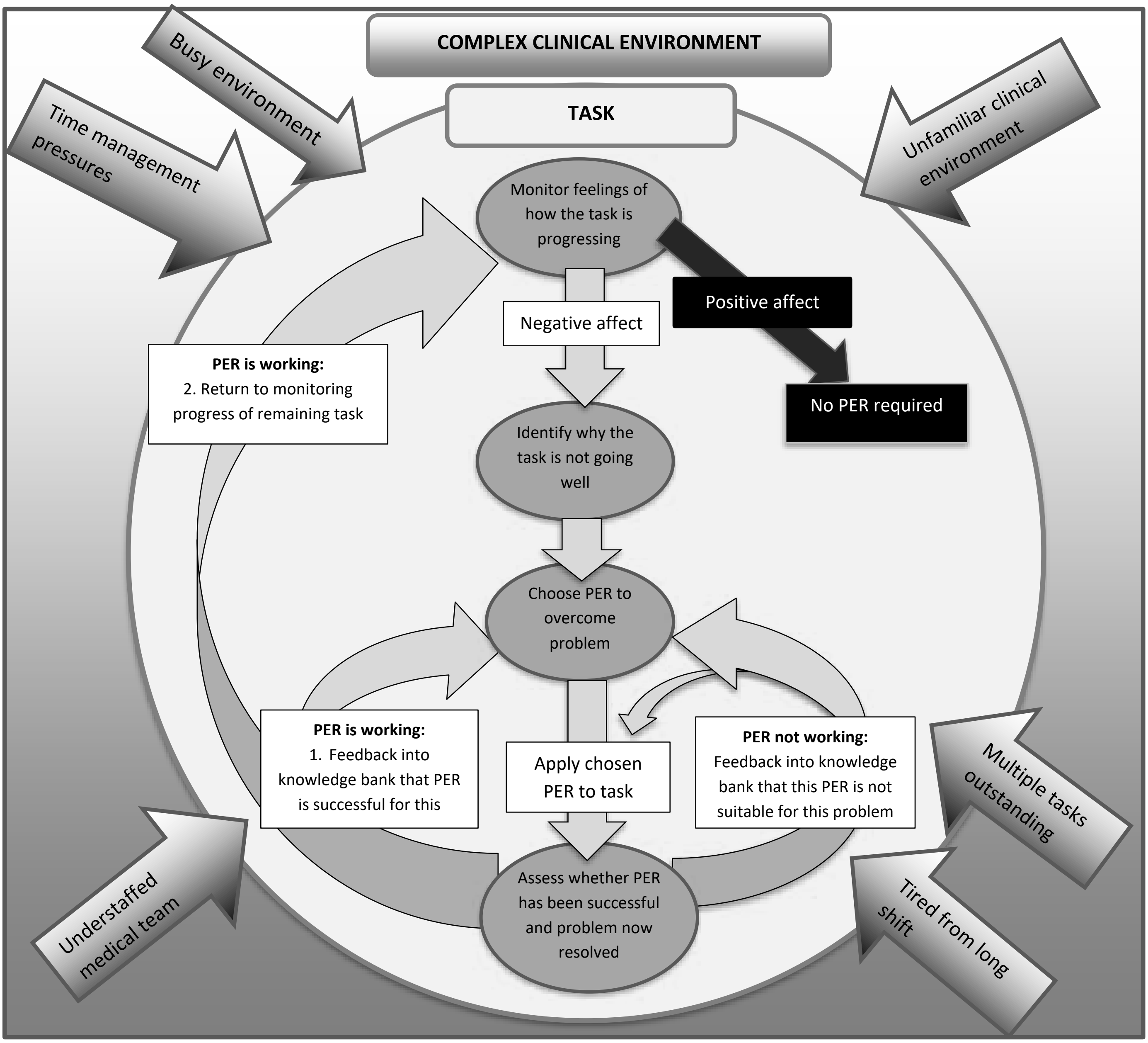


Figure 3: Contextual PERFORM model



The first step in the PERFORM model is the acknowledgement a **metacognitive feeling**; an affective, non-analytical instinct which can be positive or negative, (Efklides, 2008). Positive feelings include confidence, familiarity or 'feeling of knowing', indicating that the individual considers the task achievable. Negative metacognitive feelings include 'feelings of difficulty', which should invoke **metacognitive judgements** to explain *why* such feelings are present: These might include anxiety due to unfamiliarity, under-confidence resulting from previous failed attempts or decreased focus secondary to distractions. Once identified, a strategy (PER) can be chosen to help reduce the source of performance dysfunction. To select the most appropriate PER, the individual delves into their

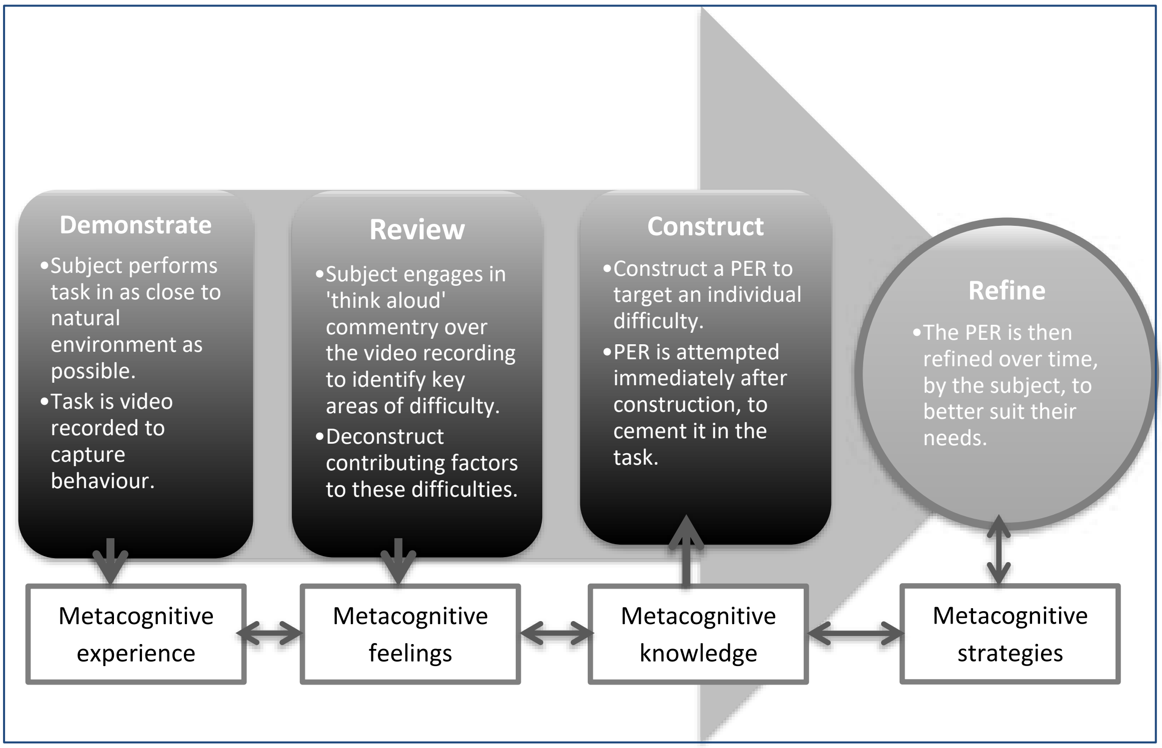
metacognitive knowledge, containing information regarding previous tasks and strategies (including PER). Once selected, the PER is implemented and evaluated for efficacy using their **metacognitive skills**.

If the PER is unsuccessful, this information is fed-back into the metacognitive knowledge bank to inform and refine future strategy selection. Simultaneously, access to the metacognitive knowledge also allows an alternative PER to be selected for the current task. This cycle continues until a positive outcome, evaluated through metacognitive skills, is reached. The positive PER experience is fed into the metacognitive knowledge bank for future reference, and the individual returns to the entry point of the model, to re-establish the monitoring of metacognitive feelings for the remainder of the task.

The PERFORM model in Action

Developing PERs for the PERFORM model (Figure 4) mirrors that of PPRs in sport,(Cotterill, 2011). According to sports coaches, training environments and strategies facilitate optimisation of psychological readiness, or 'mental toughness' (Gucciardi et al., 2009), and both are integral to the PERFORM model.

Figure 4: Developing a Performance Enhancing Routine (PER) (Arrows denote the direction of metacognitive processes)



Demonstrate

Firstly, the subject is video-recorded whilst completing the task. This is a metacognitive experience, and is used to demonstrate the individual's behaviours within the specific task, thus the environment should be as authentic as possible,(McGaghie et al., 2010).

Review

The participant and their coach review the video-recording to identify problematic emotions/behaviours within the performance. The individual drives this process; focussing on and exploring their metacognitive feelings; non-analytical, highly affective pieces of feedback highlighting discrepancies between the task progress and the expected outcome (Efklides, 2011). Deconstruction of these metacognitive feelings is facilitated by the coach to increase awareness of any contributing factors, such as:

- The use of negative thoughts/self-talk
- Distractions/lack of focus on the task
- Symptoms of anxiety
- Lack of confidence or self-efficacy

Construct

The coach provides examples of the different PERs which best address the issues identified in the review phase. Commonly used PERs in sport psychology include:

- Positive self-talk including trigger words (Moran (2004) in Cotterill, (2011))
- Visualisation (De Francesco and Burke (1997) in Gallucci, (2013))
- Deep breathing (Gallucci, 2003, page 271)
- Temporal consistency techniques e.g. 5 second count-down (Mesagno and Mullane-Grant, 2010)
- Centering (Nideffer, (1993) in Gallucci, (2013))

Alternatively, the individual might offer their own strategy, which should be encouraged. Once agreed, the PER is put into practice immediately with a repeated task of similar difficulty to the initial one. This 'trial run' marks the PER's initial integration into the individual's metacognitive knowledge bank.

Refine

Practicing the PER both optimises its physical mechanism, and refines decision-making skills regarding *when* to implement it. Each individual will undertake a unique refinement cycle, which will vary in length and conclude in the PER being perfected and eventually, automatic. Thus, the metacognitive strategy (PER) is embedded into the individual's subconscious stream, undetectably optimising their performance within more contexts than solely the original task.

PERFORM: Readiness for Practice

Psychological 'readiness' peaks during the competition stage of the training cycle. This infers that readiness is sub-optimal *before* the start of the competition phase and is enhanced during competition. Thus, the PERFORM model introduces the metacognitive processes which contribute to psychological readiness, but these skills must be honed through real-life experiences (Figure 5).

Figure 5: Worked examples of use of PER in Clinical Scenarios

Scenario 1 - A junior doctor does not use PER

A junior doctor is approached by one of the nurses on the ward, who asks her to gain intra-venous access on a patient. This patient is awaiting an urgent CT scan and requires a cannula to enable the radiographers to administer contrast. The patient cannot attend the radiology suite until they have a cannula in place, and the porters are already on the ward, waiting to take the patient for his scan. The junior doctor feels a sense of dread at this task; having had multiple failed attempts at cannulation on a different patient earlier in the day. She also remembers that the cannula must be of a wide-gauge, which is more difficult to insert than smaller-gauge cannula, to enable intra-venous contrast to be administered. The doctor looks around the ward to see if any of the other doctors on her team are available to help her, hopeful that she can avoid the task altogether. Unfortunately for her, they are not immediately available, and negative thoughts of failing the cannulation, wasting the time of the nurse and porters, and the patient missing the scan and potentially delaying necessary surgery, begin to taunt her. She feels pressured, under-confident and has low self-efficacy of achieving this important task, which will have direct consequences on patient care.

This scenario will likely feel very familiar to many junior doctors.

Scenario 2 – A junior doctor uses PPR.

On a different ward, a junior doctor receives a request from one of the nurses to gain intra-venous access on a patient awaiting an urgent contrast-CT scan. The doctor sees the porters approaching the ward and realises that she must insert a cannula efficiently to avoid the patient missing their scan. Earlier in the day, the junior doctor had been unsuccessful in cannulating a different patient, and had needed senior help. Briefly, she is reminded of this failure, and recognises the negative thoughts clouding her concentration. As she makes her way to the equipment cupboard to gather the necessary items for cannulation, she uses her PPR of taking a slow, deep breath whilst reciting an instructional self-talk to recall the steps involved in this task; "If I follow the key steps then everything will go to plan". Whilst doing this, she is not only able to gather all necessary equipment without forgetting anything, but also distracts herself from the feelings of low self-efficacy and anxiety that were entering her mind before. Focussed on the task, she enters the patient’s side-room without the distractions of previous failed attempts, but approaches the task by talking through the steps in her head.

The junior doctor here still feels the pressure of the situation due to the sense of urgency regarding the patient attending their scan, but she is able to better manage her self-efficacy beliefs and block-out negative thoughts and free-up attentional focus for the task at hand.

Summary

This collaborative AMEE Guide introduced the PERFORM model, where Performance Enhancing Routines (PERs) can be utilised by sport coaches and medical educators alike: We discussed the similarities between Medicine and Sport, and their respective interests in Metacognition. A summary of PPRs in sports then led to our conceptual model. The reader is encouraged to use PERFORM for their own educational endeavours, in the hope that this novel collaborative approach successfully optimises performance in whichever context it is applied to.

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