Self-assessment in general practice trainees: insights into the profession and its postgraduate training

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A thesis submitted in fulfilment of the requirements for the Degree of Doctor of Medical Sciences

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December 2009

Acknowledgements

I would like to thank my promotors:
Jan Degryse for introducing me to the fascinating world of medical education,
Dominique Vanpee for his continued support and advice.

I would also like to thank the other members of my jury, William D'Hoore, Jean-François Denef, Véronique Godin, Dominique Pestiaux, Jean Jouquan and Lambert Schuwirth, and the anonymous reviewers of my manuscripts for their contributions to this endeavour.

I am endebted to the Fonds de la Recherche Scientifique-FNRS whose grant subsidised this work for two years.

I would like to take this opportunity to thank Marie-Dominique Beaulieu for being such an inspiring mentor.

To my fellow research assistants, especially Sophie Leconte, Corentin Duyver, Thérèse de Foy, and Ann Roex, I would like to extend my deepest gratitude for their support and friendship.

Thanks to Astrid and Dominique without whom I would not have moved forward.

And of course, I would like to thank my husband for his IT tips and the rest… here's hoping you may read it some day.

Summary

General practice is in the midst of significant battles for professional jurisdiction. In its effort to stake its claim, it has produced new definitions of its tasks and implemented specialised postgraduate curricula. We explored the results of this endeavour by examining the perceptions of the next generation of general practitioners (GPs). In order to frame our questions, we developed a conceptual model of self-assessment as a multilayered construct. We explored trainees' professional self-concept to determine whether the professional identity of future GPs was in line with the profession's new definitions. We investigated whether our postgraduate curriculum provided relevant role models. We examined levels of self-perceived competence and self-efficacy beliefs, hypothesising that low levels might hinder ability to practice independently. We studied the role of practical training in regards to the development of self-perceived competence. Finally, we looked at levels of usable knowledge as a key indicator of potential for independent practice, and at ability to self-assess knowledge accurately as an indicator of self-monitoring ability.

Our main findings were that general practice trainees were well socialised into the profession by the end of their postgraduate training. There were however tensions between their vision of ideal practice organisation and the practice models of their supervisors. Most trainees developed sufficient confidence in their ability to practice independently. Nevertheless a significant minority of trainees did not. Volume of practice was not found to be an important factor. Confidence and competence were not linked. Other potential factors are discussed including the role of supervision.

In its aim to train autonomous professionals, postgraduate training should not limit its focus on developing competence. Further studies and avenues for improving our postgraduate curriculum are discussed. Supervisor training may be a key piece in this complex puzzle.

Résumé

La délimitation du domaine professionnel de la médecine générale fait l'objet de conflits croissants. Afin d'asseoir ses revendications, la médecine générale s'est munie de nouvelles définitions et de programmes de formation spécialisée. Nous avons analysé les fruits de ces efforts à travers les perceptions des futurs médecins généralistes. Afin de mieux préciser nos questions de recherche, nous avons tout d'abord élaboré un cadre conceptuel abordant l'auto-évaluation comme une notion à quatre niveaux. Le concept de soi professionnel des assistants en médecine générale a été étudié afin d'en évaluer la convergence avec les nouvelles définitions de la médecine générale. Nous avons également cherché à savoir si notre formation postgraduée offrait des modèles de rôle pertinents. Nous avons étudié leur sentiment d'efficacité personnelle et leur sentiment de compétence, postulant que s'ils étaient faibles, cela pourrait réduire leur capacité à pratiquer de manière autonome. Le rôle de leur pratique de stage a été analysé. Enfin, la quantité de savoir utilisable dont disposent les assistants a été mesurée comme indicateur de leur capacité à pratiquer de manière autonome.

La socialisation des assistants en médecine générale paraît satisfaisante. Leur vision des modes idéaux d'organisation de la pratique sont toutefois en opposition aux modèles proposés par leurs maîtres de stage. La majorité des assistants atteignent des niveaux adéquats de confiance en leur capacité à pratiquer de manière autonome. Ce n'est toutefois pas le cas d'une minorité non négligeable d'individus. Cela ne semble pas être lié au volume de pratique. D'autres facteurs potentiels sont discutés, notamment le rôle de la supervision. Confiance et compétence ne sont pas liées.

Dans sa mission de formation de professionnels autonomes, le curriculum postgradué en médecine générale ne peut se cantonner au développement de compétences. Diverses voies de recherche et d'amélioration de notre curriculum sont discutées. La formation des maîtres de stage pourrait notamment en tenir compte.

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Introduction: General practice, a profession reinventing itself

General practice has been in the midst of reforms and redefinitions for the past 40 years. Whilst primary care was at the heart of the "Health for All" program of the World Health Organization (WHO), the profession has faced increasing challenges from specialty medicine and the allure of highly technical care on the one hand, and complementary medicine and allied health professions on the other (Moore & Showstack 2003; Showstack et al. 2003; Stevens 2001). The profession is also facing a recruitment and retention crisis (Colwill 1992; Baker et al. 1995; Kmietowicz 2001; Levasseur & Schweyer 2004; MacKean & Gutkin 2003; Rosser 2002; Rowsell et al. 1995; Sullivan 2002; Van Baelen et al. 2001). Whilst this crisis has been studied from the patient, student, and practitioner perspectives (Astin 1998; Baker et al. 1995; Block et al. 1996; Eliason & Schubot 1995; Fincher et al. 1994; Huby et al. 2002; Institut Scientifique de Santé Publique 2001; Jordan et al. 2003; Kutob et al. 2003; Martini et al. 1994; Schafer et al. 2000; Safran 2003; Young et al. 1996), Abbott's sociological systemic analysis of the professions provides further valuable insights into the plight of general practice (Abbott 1988).

I. Definitions and key characteristics of the professions

The term profession can be defined in various ways. Abbott refers to the professions as "occupational groups controlling the acquisition and application of various kinds of knowledge" (Abbott 1988). Curry and Wergin define the professions as "occupational groups that (1) share specialized skills requiring extensive systematic and scholarly training, (2) restrict access with rigorous entrance and exit requirements, and (3) because of their importance to society, claim high social prestige" (Curry et al. 1993). Cruess et al. propose the following definition (Cruess et al. 2004): "an occupation whose core element is work based upon the mastery of a complex body of knowledge and skills. It is a vocation in which knowledge of some

department of science or learning or the practice of an art founded upon it is used in the service of others. Its members are governed by codes of ethics and profess a commitment to competence, integrity and morality, altruism, and the promotion of the public good within their domain. These commitments form the basis of a social contract between a profession and society, which in return grants the profession a monopoly over the use of its knowledge base, the right to considerable autonomy in practice and the privilege of self-regulation. Professions and their members are accountable to those served and to society." Autonomy, control and self-regulation are key components of these definitions. Specialised knowledge is another. Indeed Schön (Schön 1996) bases his entire concept of the professional on the specific way that a professional applies knowledge to solve ill-defined, murky, real-life problems. According to Schön, professional practice relies on three modes of knowledge application: knowing-in-action, reflection-in-action, and reflection-on-action. Knowing-in-action refers to the implicit knowledge that a professional applies to solve routine problems, in an automatic fashion. When faced with complex, ill-defined problems, professionals must use another strategy which he calls reflection-in-action. He describes reflection-in-action as a "conversation with the problem", in which the practitioner attempts a solution, analyses its consequences, formulates hypotheses, and tries something else until a satisfactory outcome is secured. Reflection-on-action is a deliberate analysis of past problem-solving events used either in moments of curious introspection or more purposefully when planning future actions. Reflection-on-action allows the professional to learn by creating an explicit repertoire of problem-solving strategies.

II. The predicament of general practice through the lens of professional competition

According to Abbott (Abbott 1988), a profession is defined by its tasks. He refers to the link between a profession and its tasks as its "jurisdiction". In his analysis of the system of professions, he describes how professions develop

within a closed system where “jurisdictional boundaries are perpetually in dispute”. Professions compete for various privileges: “in claiming jurisdiction, a profession asks society to recognize its cognitive structure through exclusive rights (…). These claimed rights may include absolute monopoly of practice and of public payments, rights of self-discipline and of unconstrained employment, control of professional training, of recruitment, and of licensing, to mention only a few” (Abbott 1988). These claims are not only concerned with professional tasks but also with professional autonomy in terms of self-regulation and professional training. These professional battles are waged in three types of arenas: the legal arena (Abbott uses this term in a general sense including that of regulatory authorities), public opinion, and the workplace.

Professions have often been characterised by their organisation in guilds, colleges or other types of professional bodies (Abbott 1988). These professional bodies serve several important purposes. By publishing definitions of the roles and tasks of the profession, they lobby the state and public opinion for professional jurisdiction. They are also usually granted discretion regarding professional regulation.

Another important actor in professional competition is the professional school or university. Rigorous training based both on abstract knowledge and application of this knowledge is a hallmark of professions (Abbott 1988; Curry et al. 1993). According to Abbott, academic centres play three crucial roles in professional competition: 1) they provide cultural legitimacy by tying professional tasks to theoretical, scientific knowledge (unlike the crafts for instance whose knowledge base is purely practical), 2) they provide new knowledge through research, and 3) they educate future professionals (Abbott 1988). This explains why substantial parts of the curriculum may seem irrelevant to professional practice: the aim is not solely to provide future professionals with the tools to practice effectively; legitimacy and prestige are also at stake. For this role to be fulfilled, the curriculum must be

seen to refer extensively to a scientific body of knowledge, e.g. to the basic sciences in the medical curriculum.

In its educational role, the professional school has two main tasks: to teach future graduates how to apply knowledge to solve the problems that they will later encounter, and to socialise them into the profession. Historically, some have taken the extreme view that basic knowledge should be learnt in academic centres whilst practical skills could only be acquired in actual practice, i.e. through an apprenticeship. There have however been many critiques of this model. Firstly, relevant knowledge can be learnt in a classroom setting. Problem-based curricula for instance have been developed in response to findings in cognitive research indicating that learning is more readily transferred into practice when it is linked to problem-solving exercises. Schön proposes that important pre-practice training should take place in what he refers to as the “reflective practicum”, a “virtual world” mimicking practical settings in which the learner is guided by an expert tutor in reflective problem-solving exercises in a safe environment (Schön 1987). Relevant practical learning can therefore occur throughout the curriculum, including in the classroom. Secondly, the haphazard nature of learning in an apprenticeship has stimulated calls for more systematic methods of learning (Harden et al. 1984). Postgraduate curricula are now being developed with formal opportunities for learning complementing apprenticeship learning (EURACT 2005). Nevertheless, the apprenticeship remains an important part of professional training. Indeed it is uniquely suited to socialising students into their future profession through immersion in professional tasks and role-modelling (EURACT 2005; Lublin 1992; Pitkala & Mantyranta 2003; Wright et al. 1997).

A new role for professional schools is increasingly being discussed: producing and maintaining self-regulating professionals. Professions are characterised by their autonomy. Society grants professional bodies the remit of regulation, i.e. guaranteeing that its members perform to a minimum acceptable standard. However, ensuring end of training standards is not sufficient: competence must be maintained and developed. The knowledge explosion has rendered continuing education mandatory. The deliberate

practice literature (Ericsson 2004) has also shown that competence is not correlated to experience as such. In fact, if deliberate action is not taken, competence tends to diminish with time. Maintenance of competence and development of expertise require a continuous effort after graduation. Professionals must therefore be life-long learners (Handfield-Jones et al. 2002). Broadly speaking, professional bodies delegate their regulatory role to individual members by relying on them to engage in appropriate self-directed learning (Curry et al. 1993; Regehr & Eva 2006). This presupposes that individuals self-assess correctly and then take appropriate actions with professional bodies and professional schools providing continuing learning opportunities (Handfield-Jones et al. 2002; Regehr & Eva 2006). Furthermore, self-monitoring ability and mindfulness ("observing the observer observing the observed", "conscious and intentional attentiveness to the present situation" (Epstein et al. 2008)) are increasingly viewed as crucial to autonomous professional practice (Epstein et al. 2008; Epstein 1999; Eva & Regehr 2005). Doctors should continuously monitor themselves during day-to-day tasks in order to ensure that they are practicing safely. If professionals must be self-regulating both in their learning and in their practice, it seems logical that self-regulating skills be part of the remit of professional schools (Curry et al. 1993; Epstein et al. 2008; Mann et al. 2007; Schön 1987). Doubts have however been cast on the ability of professionals to self-assess accurately and on their propensity to select appropriate learning activities (Eva & Regehr 2005; Regehr & Eva 2006). New models of continuing professional development are emerging which include external sources of assessment and feedback (Eva & Regehr 2008; Handfield-Jones et al. 2002; Jamtvedt et al. 2006; Sargeant et al. 2008; Veloski et al. 2006).

General practice is in a difficult position in the system of professions: in being general, it lacks a clearly identifiable knowledge base and exclusive tasks. Indeed it battles on two opposing fronts in its struggle for jurisdiction: one against the medical specialists and one against paramedical professions (Moore & Showstack 2003). Its knowledge base is difficult to delineate,

partly technical, partly humanistic (Stevens 2001). Furthermore, just as in other medical specialties, the knowledge explosion and more bureaucratic work environments have encouraged sub-specialisation (Moore & Showstack 2003). The recruitment and retention crisis means that tasks have increasingly been delegated to allied health professionals including nurse practitioners. This currently subordinate profession is gaining in autonomy and threatens to weaken general practice's claim to jurisdiction on a wide range of tasks (Horrocks et al. 2002).

In its endeavour to claim jurisdiction, the profession has made several attempts at redefining itself (Olesen et al. 2000; Pestiaux & Vanwelde 2002; WONCA Europe 2002). These publications demonstrate the efforts of the profession to define its uniqueness and to publicise its jurisdictional claim. In another key step in its claim to jurisdiction, general practice has implemented specialised postgraduate training. In Europe, the 1986 86/457/EEC European directive rendered specific vocational training compulsory for general practice with a minimum of 6 months of postgraduate training being spent in general practice. In 2005, the European Academy of Teachers in General Practice (EURACT) published its Educational Agenda, outlining the educational methods required to train general practitioners according to the WONCA-Europe (World Organization of Family Doctors – European branch) definition (EURACT 2005). Its aims were five-fold:

"For those involved in delivering general practice education and in developing programs of teaching general practice, it is designed to provide a framework to teach the core competencies. For those who learn the discipline, it aims to offer an educational framework for setting the learning aims, and monitoring their achievement. For those involved in curriculum building, it should be used to determine priorities in teaching and learning general practice. For healthcare developers, it is meant to contribute to national policy development. For the whole medical profession, it is conceived to define what specific competencies can be expected from the specific discipline called General Practice/Family Medicine as a crucial contribution to healthcare."

This broad scope of objectives demonstrates an awareness by the profession of the potency of publicising educational reforms in its claim of jurisdiction. One of EURACT's main demands is for longer training in a general practice setting. This is crucial in that historically the skills of a GP were considered "general" and specialised settings were deemed appropriate to learn them. Specialists were seen as possessing the same basic, general, skill set plus additional specialised competencies. In becoming a medical specialty in its own right, general practice claims that it has a specialised body of competencies which require specialised training. The EURACT Educational Agenda also emphasises the importance of role modelling and socialisation into the profession that only training in a general practice setting can provide.

If general practice is to consolidate itself as an autonomous profession, both these endeavours must be a success: the new definitions must be translated into practice and vocational training must fulfil its task of producing "doctor(s) who ha(ve) obtained a level of clinical competence sufficient for independent practice" (European Union of General Practitioners, UEMO, statement) (UEMO 2003).

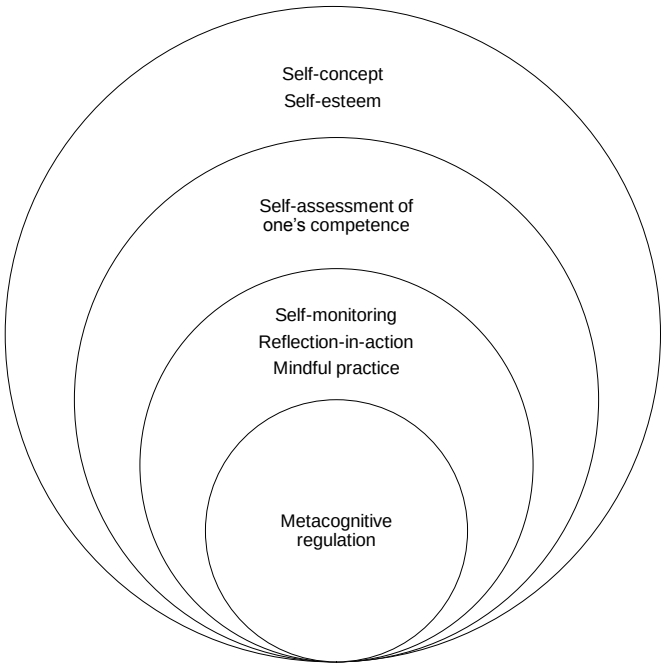
III. General aim of the project

In this troubled context, we believe that studying the population of general practice trainees should provide valuable insights into the past and future of the profession. They are at a crossroads, influenced by their medical training, by their general practice supervisors, by their first experiences of general practice. They also represent the future of the profession. We sought to study the professionalisation process of general practice trainees, i.e. the development of professional identity and of autonomy (in terms of perceived ability to practice independently and in terms of metacognitive regulation ability).

IV. Specific research questions

In this context of professional redefinition and implementation of new postgraduate curricula, we aimed to examine general practice trainees' views of their future profession and of their training. We developed a self-assessment framework to study their perceptions at different levels:

Self-assessment: a multi-layered construct



1. Professional identity

How do general practice trainees perceive general practice, the role of general practitioners, and how do they envision their future career? Are these perceptions in line with official definitions? Does postgraduate training provide them with relevant role models?

2. Perceived competence

Do general practice trainees feel competent? How do these feelings evolve during training? How has postgraduate training contributed to their feelings of (un)preparedness for practice? What are the determinants of perceived competence?

3. Level of usable knowledge in general practice

Do general practice trainees possess adequate levels of usable knowledge relevant to their future practice? Are they able to assess their application of knowledge adequately?

V. Overview of the methods

To frame these questions we first sought to clarify the concept of self-assessment through a literature review. We then conducted a qualitative, exploratory study which we followed-up in a second study using a quantitative cross-sectional design.

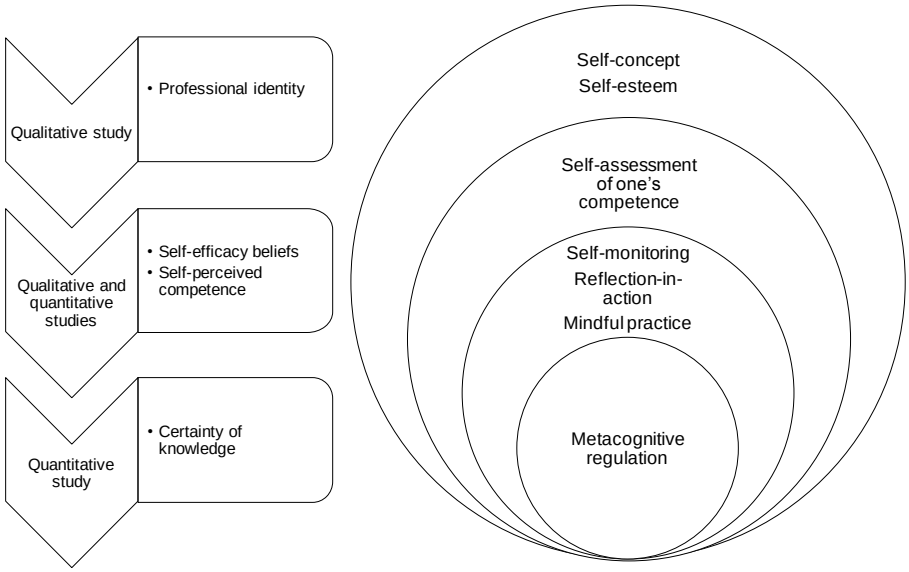
1. Qualitative study

A qualitative focus group study was conducted in 2004 in Belgium and France to examine the questions pertaining to professional identity and perceived competence.

2. Quantitative cross-sectional study

A quantitative cross-sectional study was conducted in 2005 in Belgium to examine questions of perceived competence and metacognitive regulation.

Diagram of our analysis of self-assessment in general practice trainees



VI. Contents of the thesis

The following chapters are transcripts of published[1] or submitted manuscripts reporting our findings.

Chapter 1 reports our conceptual exploration of self-assessment.

Chapter 2 reports findings from the qualitative study of professional identity.

Chapter 3 reports findings from the qualitative study of perceived competence.

Chapter 4 reports findings from the quantitative study of perceived competence.

Chapter 5 reports findings from the quantitative study of metacognitive regulation.

[1] Spelling was harmonised to British English in this document. Errors in the reporting of participant characteristics were corrected (the modifications are signposted).

Chapter 1: Self-assessment: a conceptual framework

Loosely translated from “L'auto-évaluation : postulat préalable, finalité de la mission éducative ou utopie pédagogique ? Clarifications conceptuelles et pistes pour une application en éducation médicale.” Dory V, de Foy T, Degryse J. Pédagogie Médicale 2009;10(1):41-53.
http://www.pedagogie-medicale.org/index.php?option=article&access=standard&Itemid=129&url=/articles/pmed/abs/2009/01/pmed20080318/pmed20080318.html

Key messages

- Self-assessment is a hot topic in medical education. It is assumed to be central to self-directed learning and self-regulated practice.
- Self-assessment has many facets: from general assessments of self-concept and self-esteem, to assessment of one’s competencies, assessment of oneself in action, and metacognitive regulation. All of these facets are relevant to medical education.
- When assessed from a psychometric point of view, the accuracy of students’ and doctors’ self-assessment appears to be rather weak. Several studies suggest that underperforming individuals tend to overestimate themselves.
- There are no valid studies demonstrating that self-assessment has an impact on: 1) educational needs assessment; 2) learning activity; 3) clinical performance; and 4) patient outcomes. Neuro-psychological explanations reinforce the finding that self-assessment is inaccurate.
- Taken together, these results suggest that the primary goal should be to train medical students and practitioners to search for explicit and recurrent external feedback, and to combine its results with those of self-assessment in order to optimise both their learning activities and their clinical practice.

I. Introduction

Self-assessment is a hot topic and has been the subject of several recent publications in the educational literature and more specifically in the medical education literature (Boud & Falchikov 1989; Colthart et al. 2008; Eva & Regehr 2005; Eva & Regehr 2008; Gordon 1991; Ward et al. 2002). It has usually been discussed in relation to the concept of autonomy, often viewed as an educational goal. Self-assessment has therefore been considered within the frameworks of self-directed learning or self-regulated practice. As a result of these different frameworks and the various underpinning theoretical constructs, self-assessment has been defined in multiple and sometimes ambiguous ways. Some articles describe self-assessment as an ability, others as a strategy, others still as a mental process or a personality trait.

The aim of this article is to clarify the various concepts linked to self-assessment, to summarise the relevant findings form the literature and, while outlining the gaps further research should explore, to provide suggestions for practical applications in both formal and continuing medical education.

II. Definitions and conceptual keys

A. Self-assessment and related concepts

In order to understand the concepts linked to self-assessment and the related implications, it is useful to categorise them even though this may lead to oversimplification. They can be differentiated according to several dimensions: what is being assessed (subjective evaluation of what one is, what one is able to do, what one does), the timing of the assessment in relation to a given action (before, during or after), or the level of specificity of the assessment. The latter dimension is the one we will use to present the different concepts, from the most global to the most specific (figure 1). We

ask the reader to bear in mind that this is a simplified representation of the different concepts and that in reality there is a degree of overlap.

1. Self-assessment as a global evaluation of oneself

At the most general level, there are two types of self-assessments of oneself: self-esteem and self-concept. Self-esteem is an evaluation of one's worth. Self-concept is a representation of one's global or partial (e.g. professional) identity. These concepts cover an individual's assessment of what s/he "is".

2. Self-assessment as an evaluation of one's competencies

At a more specific level, self-assessment may refer to one's evaluation of one's competencies. This judgement can take place after a specific performance or before action as an assessment of one's potential ability to perform.

The latter form of self-assessment has been specifically explored in social psychology under the term "self-efficacy beliefs" (Bandura 1997). This school of thought is interested in the processes involved in human agency. According to its most prominent representative, Albert Bandura, one of the main factors of human agency is an individual's perception of his/her ability to recruit his/her competencies to perform a given task. These beliefs are specific judgements relating to a specific task in given circumstances and are based not only on the individual's perception of his/her ability but also on his/her perception of the environment's vulnerability to his/her actions. This perception is influenced by several elements: personal interpretation of one's past experiences (successes and failures, overcoming obstacles) or of peers' experiences (when relevant personal experiences are unavailable), verbal messages from others (encouraging or disparaging), and physiological sensations and their interpretation (e.g. a racing heartbeat may be interpreted as indicating either a dangerous or an exciting situation). Self-efficacy beliefs' impact on action is mediated by various processes. Self-efficacy beliefs influence the use of cognitive strategies (e.g. positive

visualisations of success), emotion (e.g. anticipated satisfaction from expected success), motivation, and choice of action.

An individual with strong self-efficacy beliefs is more likely to attempt more difficult challenges, to persevere when faced with obstacles, and to use optimal cognitive strategies, thus increasing the likelihood of success. Such self-assessments do not aim therefore to reflect reality but to create reality.

Obviously excessive overconfidence may be dangerous (e.g. believing that one is able to fly off a cliff top is unlikely to result in a positive outcome) but measured optimism in one's self-assessments has been shown to be generally favourable to individuals.

Two other concepts related to self-assessment are best described as strategies that can be used to develop one's assessment of one's competencies: self-directed assessment seeking and reflection-on-action. Self-directed assessment seeking is a term coined by Eva et Regehr referring to the active, deliberate and self-directed seeking out of feedback in order to enhance one's self-assessment of one's competencies (Eva & Regehr 2008). Reflection-on-action was coined by Schön as one component of reflective practice (Schön 1996). It refers to a conscious, analytical evaluation of the effects of one's actions after they have occurred and to the interpretation of the causes and consequences of these effects. Reflection-on-action can be used to prepare oneself for a task ahead, for example by influencing the choice of learning activities. It is often used during curious or deliberate introspection before engaging in an anticipated task.

3. Self-assessment as an evaluation of oneself in action: the essence of reflective practice

According to Schön, the characteristic element of professionals' practice is what he calls reflection-in-action (Schön 1996). According to Schön, professionals use reflection-in-action when faced with complex, ill-defined problems which cannot be resolved by the automatic application of routine

solutions. He describes reflection-in-action as a “conversation with the problem”, during which experts will try a solution, analyse the results and try again, and so on. In other words, reflection-in-action constitutes real-time evaluation of the consequences of one’s multiple actions within the larger context of solving a complex problem. This process requires formulating working hypotheses, testing them and reassessing them in view of the results. Whilst this process is not an automatic one, it should not be seen as purely analytical. It is embedded in action unlike reflection-on-action which is an explicit, deliberate analysis of past actions.

Several authors have used the term self-monitoring to refer to this type of process (Epstein et al. 2008; Eva & Regehr 2008), which is also akin to what Epstein calls mindful practice (Epstein 1999). The main difference between these concepts is the principal object of the observation, i.e. oneself or the situation as a whole. In fact, in all of these processes, the individual pays increased attention to the unravelling of a situation with him/herself more or less as a part of the situation. The concept of mindful practice refers to the paying of increased attention to oneself during action, i.e. “observing the observer observing the observed”, being aware of one’s sensations, emotions and mental processes during professional practice (Epstein 1999). Self-monitoring and reflection-in-action are more interested in the evaluation of the results of one’s actions in order to determine the next sequence of actions to undertake (Eva & Regehr 2008).

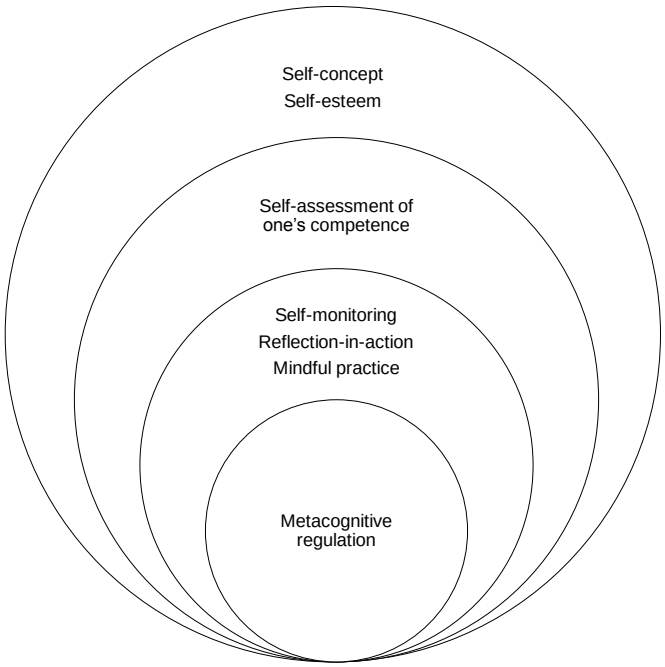
4. Self-assessment as metacognitive regulation

Like any biological system, cognition has a feedback loop at a metacognitive level, based on processes of monitoring and control. These processes require that the individual evaluate his/her own mental processes in real-time, usually subsconciously (Nelson & Narens 1994; Son & Schwartz 2002).

We have presented the different concepts linked to self-assessment from the most global category to the most specific (figure 1). All of these concepts

require an element of personal judgement, which is why, in line with Eva and Regehr's recommendations (Eva & Regehr 2008), we have not included the process of self-administering an objective test within the framework of self-assessment. Self-assessment processes can occur consciously or subconsciously, explicitly or tacitly. In this sense, the word assessment should be understood loosely and not be considered to refer solely to conscious analytical processes. Indeed Bandura (Bandura 1997) for instance speaks of "beliefs" or "judgements". These semantic ambiguities may explain the focus on accuracy of self-assessment. The terms judgement and beliefs allow greater acceptance of subjectivity as opposed to assessment which implies a requirement of validity and reliability.

Figure 1: Concepts related to self-assessment according to degree of specificity



B. Potential relevance of the self-assessment framework in medical education

Eva and Regehr have discussed the relevance of self-assessment for medical practice at two levels (Eva & Regehr 2005). The first is self-directed learning in particular for continuing professional development where it is often postulated that physicians are able to select learning activities based on their self-assessed learning needs (Jacques et al. 2002). This function requires ability to judge one's competencies broadly by topic in summative fashion using questions such as "am I competent in heart failure management?". Such judgements are often based on subconscious perceptions which are likely to be linked to rather global self-perceptions. Such self-assessments could also be based on deliberate strategies of reflection-on-action and self-directed assessment seeking (i.e. where physicians seek feedback from others in order to enhance their self-assessment).

The second level, which they argue is the most important, concerns daily regulation of one's practice, during each clinical encounter, in each action undertaken. This type of self-assessment seeks to answer questions such as "am I sure I've made the right diagnosis or should I refer the patient for specialist advice?" or "is the patient's response to treatment normal or should I suspect a complication?". This type of judgement is more akin to self-monitoring, or in some cases to metacognitive regulation, and is based on conscious or subconscious processes such as those involved in reflection-in-action.

Other constructs related to self-assessment are likely to also be relevant to medical education. Self-concept for instance may be linked to career choice. Self-assessment of one's competencies followed by feedback could be useful in integrating professional norms and standards (Gordon 1991). Self-efficacy beliefs may be important for retention in a profession (Dory et al. 2009). Furthermore constant self-doubt is usually inhibiting and is generally

favourable neither to the patient nor to the physician. These conceptual frameworks can be used in developing educational interventions designed to reinforce the belief in one's competence, in particular in clinical settings, using feedback and role modelling. Finally, self-assessment as metacognitive regulation is crucial to learning and factors affecting metacognitive regulation should be understood in order to optimise learning.

Hence, self-assessment deserves further attention and we shall proceed to summarise the findings from the literature, especially from the medical education literature.

III. Data on self-assessment in medical education

A. Preliminary remarks regarding semantics

The following summary is based on the results of several recent reviews of the literature. Preliminary remarks regarding semantics are necessary in order to evaluate the significance of reported findings, some of which may seem somewhat simplistic in view of the complexity of the topic.

In 1991, Gordon published a review on the validity and accuracy of self-assessment in health professionals' education (Gordon 1991); he suggests that professionalisation implies "provid(ing) the trainee with norms and expectations of professional behavior, including recognition of one's own abilities and limitations". He adopts a psychometric stance and distinguishes the validity of self-assessment (judging one's performance against appropriate criteria) and the accuracy of self-assessment (achieving reasonable agreement between self-assessment measures and valid external measures of one's performance).

Boud and Falchikov, in a review of the quantitative studies pertaining to self-assessment in higher education (Boud & Falchikov 1989), define self-assessment as "the involvement of learners in making judgements about their own learning, particularly about their achievements and the outcomes

of their learning", which covers two aspects: "the identification of criteria or standards to be applied to one's work, and the making of judgements about the extent to which work meets these criteria".

Ward et al., authors of a 2002 review of the methods used in research on self-assessment, describe self-assessment as "the ability to accurately assess one's strengths and weaknesses" (Ward et al. 2002).

Davis et al., authors of a 2006 systematic review of the accuracy of physicians' self-assessment, characterised self-assessment as "the ability of physicians to determine their own learning needs and resources to meet them" (Davis et al. 2006).

Finally, Colthart et al., authors of the latest systematic review on the effectiveness of self-assessment published in 2008, agreed on an operational definition of self-assessemnt as "a personal evaluation of one's professional attributes and abilities against perceived norms". Their goal was to evaluate interventions aimed at improving self-assessment in order to positively impact identification of learning needs, learning activity and/or clinical practice (Colthart et al. 2008).

Most of these definitions envisage self-assessment as a conscious strategy for evaluating one's competencies and shortcomings, aimed by and large at enhancing learning. All of these definitions stem from a psychometric perspective, implying that self-assessment should ideally be as accurate as possible. Furthermore, the aspect of self-monitoring of one's clinical activity is scarcely addressed.

B. Main findings

1. Accuracy of self-assessment

In his 1991 review, Gordon found that health professionals in training did not demonstrate accurate self-assessment when their self-assessments were compared to external assessments (written exams, supervisor reports).

Correlations between self- and external assessments were in the order of 0.3. Successive self-assessments were well correlated, suggesting that self-assessment measures reflect stable self-concept rather than specific task-related assessments (Gordon 1991).

Davis et al., in their 2006 systematic review of studies on the accuracy of physicians' self-assessment, found similar results, i.e. most studies report low or non-significant correlations between self- and external assessments (Davis et al. 2006).

2. Effectiveness of self-assessment

The BEME (Best Evidence Medical Education) systematic review published in 2008 focused on the effectiveness of self-assessment of health professionals in training and in practice (Colthart et al. 2008). The authors analysed effectiveness in terms of impact on: 1) identification of learning needs; 2) learning activity; 3) clinical practice; and 4) patient outcomes. The authors of the systematic review bemoaned the lack of studies with sound methodologies addressing the impact of self-assessment interventions on these four criteria.

3. Specific aspects

a. Self-assessment accuracy and gender

Several studies addressed the issue of the link between self-assessment ability and gender. Some report a tendency for men to overestimate themselves and for women to underestimate themselves but the results from both the medical education literature (Colthart et al. 2008) and the higher education literature more generally (Boud & Falchikov 1989) are inconsistent.

b. Accuracy of self-assessment and level of competence

Studies conducted with students and practitioners alike have found low levels of accuracy in self-assessment (Davis et al. 2006; Gordon 1991).

Some have however found that individuals whose external evaluation was poorest had a tendency to overestimate themselves (Boud & Falchikov 1989; Colthart et al. 2008; Davis et al. 2006), suggesting a potential link between competence in a task and self-assessment ability in the same task.

Albanese et al. sought to evaluate the role of a statistical artefact known as regression to the mean in this observed phenomenon (Albanese et al. 2006). It is possible to explain regression to the mean intuitively as follows. The law of normal distribution indicates that most individuals are average and that the frequency of extreme scores or measures is low. When performance is measured on a single occasion in a sample of individuals, extreme performers are therefore more likely to be average individuals on an unusually good or bad day. Take the case of an average individual whose score on a particular occasion was untypically low. If s/he assessed himself as average, s/he may be accurate in his/her self-assessment but will appear to be overestimating him/herself. The opposite is true for individuals with an excellent score: most of them might well accurately self-assess themselves as average and be seen to be underestimating themselves. Albanese et al. studied self-assessment in year-2 medical students. Students sat a written test consisting of 100 multiple choice questions. To distinguish between "true" bad students and "false" bad students, they compared the score on the test with students' grade point average which they suggested would more accurately reflect students' actual level of ability. "True" bad students overestimated themselves to a larger extent than "false" bad students, indicating that regression to the mean does not fully explain the tendency for optimism in students who perform badly on a test.

IV. Explanatory hypotheses regarding the lack of accuracy of self-assessment

A. Methodological limitations of studies

Ward et al. conducted a critical analysis of methods used in studies of self-assessment and described several common methodological flaws (Ward et

al. 2002). Most studies measured self-assessment at the group level. Such studies may miss the fact the some individuals are good self-assessors. Self-assessment measures are often compared to external measures that do not have documented validity and reliability. Finally, self-assessment instruments often rely on scales without adequate anchors, paving the way for very different interpretations of what each point on the scale represents. Such variations within a group render the interpretation of results extremely problematic. The authors of the various systematic reviews presented have all stated that the overall methodological quality of included studies was low (Boud & Falchikov 1989; Colthart et al. 2008; Davis et al. 2006).

B. Neurocognitive obstacles to accurate self-assessment

Epstein et al. (Epstein et al. 2008) and Eva and Regehr (Eva & Regehr 2005; Eva & Regehr 2008) have provided an overview of existing hypotheses regarding inaccuracy of self-assessment. Self-assessment requires access to valid data on oneself. This may be straightforward when looking at performance in sports for instance where objective data are readily available, via our perceptual senses, and do not require complex interpretation. This is not the case for cognitive activities which do not have simple observable outcomes. Research in metacognition has shown that individuals use cues to assess their cognitive ability. For instance if one found it easy to remember a list of words, one is more likely to think that it will be easy to retrieve a word from the list later on. A valuable source of data for health professionals in practice or in training is feedback, explicit or implicit, from patients, supervisors or peers. However it appears that feedback is in fact scarcely given in the clinical environment. In health systems where patients can choose their doctor, patient lists end up mirroring the doctor, and patients who stay with a doctor are likely to be satisfied and therefore a source of positive feedback. Furthermore, these data require interpretation. Less analytical areas of the brain such as the limbic system are involved in self-perceptions. Our interpretations are therefore prone to subconscious influence by our emotions. We tend to lend more credence to positive feedback than to negative feedback. Memory of

events and performance are also a prerequisite and memory has been shown to be a far from accurate record of experiences.

C. Psychosocial reasons to self-assess inaccurately

Inaccurate self-assessment could also be adaptive. Some psychologists have referred to the concept of “psychological immune system” aimed at protecting the individual’s ego (Eva & Regehr 2005). The self-efficacy literature has shown the positive results of a degree of optimism in one’s self-assessment. Several experiments have shown that by artificially increasing individuals’ self-efficacy beliefs, they attain higher levels of performance in areas as diverse as sports and mathematics. This phenomenon is likely explained by individuals recruiting internal resources more effectively, having higher levels of motivation, and exerting more effort (Bandura 1997).

V. Implications for undergraduate and postgraduate training, and continuing professional development of health professionals

A. Undergraduate and postgraduate training

Following in the steps of Knowles (Knowles 1973), the principles of adult learning theory have postulated that autonomy is what distinguishes the adult learner from the child learner, in that s/he has accumulated experience serving as a resource for learning which is geared towards problem-resolution (usually professional problem-resolution). The literature pertaining to self-assessment questions this postulate and has served as the basis for various recent challenges to these principles. Norman for instance, in a controversial 1999 paper, disputes the idea that the simple fact of being an adult grants autonomy to the adult learner (Norman 1999). He argues his point using findings from the literature demonstrating that medical students are poor performers when it comes to self-assessment and self-directed learning. Autonomy in learning should therefore not be viewed as a principle in medical training but rather as an educational goal worked towards using appropriate educational interventions including feedback.

Based on his own studies and on a review of the expertise literature, Ericsson developed the concept of deliberate practice whereby two elements are key to the attainment of expertise: a sufficient number of hours spent on persistent, often solitary, practice, and repeated feedback from a coach whose role is to provide feedback, to guide the practitioner, and to motivate him/her to aim relentlessly for improvement (Ericsson 2004). In this framework, experts are remarkable in the sense that they constantly strive to improve on their current level of performance, systematically seeking better solutions to the problems they encounter, engaging proactively in activities likely to benefit their learning, and actively soliciting feedback from appropriate guides.

Cognitive psychology research can also shed light on the role of feedback in learning (Butler & Winne 1995). During independent learning, the learner sets him/herself goals. These goals depend on prior knowledge but also on elements such as epistemological beliefs, strategic knowledge, and self-efficacy beliefs regarding learning. Epistemological beliefs are an individual's understanding of the nature and source of knowledge. Knowledge can be viewed as simple or complex, intrinsically true or false or context-dependent, as something to memorise or to construct. These beliefs influence the criteria against which the learner will monitor his/her learning. They will also affect his/her use of learning strategies, i.e. superficial versus deep. Self-efficacy beliefs regarding learning will influence motivation and goal setting. During learning, the individual will monitor not only the outcomes of learning (mainly in terms of rate of progress) but also his/her mental activities and representations. Feedback can be aimed at the outcomes of learning but also on the processes and epistemological beliefs related to learning, on the strategies used, and on self-efficacy beliefs. Feedback should not simply aim to inform the learner about his/her new knowledge/competence but also to enhance learning more generally. Self-assessment should not replace external assessment nor should we abandon self-assessment altogether. Both are likely to influence learning and should be taken into account when developing educational interventions. The aim should be to make the two

processes more explicit and complementary. Using video recordings of clinical interactions is one example of how this can be done. Viewing the recording can be used both for self-assessment and for external feedback purposes allowing the trainee to perceive his/her strengths and weaknesses (Martin et al. 1998; Ward et al. 2003). Feedback can also allow trainees to understand the standards expected of him/her. Feedback should also include an educational prescription to help trainees use the most appropriate learning strategies (O'Brien et al. 2003).

Exposure to role models has also been shown to be crucial. Role models allow learners to integrate professional norms but also play a part in motivation and in the development of self-efficacy beliefs. Studies have found that exposure to explicit role models can help trainees believe that they are capable of attaining the modelled objective (Bandura 1997). Role models should show or discuss their own difficulties and experiences of surmounting obstacles as this may increase trainees' self-efficacy beliefs (Bandura 1997).

Epstein et al. have argued that mindful practice, whereby the practitioner becomes aware of his/her perceptions, feelings and reasoning while paying attention to information from patients and context, is a critical competency of expert physicians. According to these authors, mindful practice can be encouraged in learners by practice and feedback, exposure to clinical role models, and use of tools aimed at fostering mindful practice such as reflective diaries or the SIFT (sensations, images, feelings and thoughts) technique (Epstein et al. 2008). A review of the literature on reflective practice (Mann et al. 2007) has suggested that the results, albeit limited, of studies to date indicate that reflective practice can be learnt. The learning environment seems crucial in this respect and should foster openness and debate, and adapt to students' learning styles. Support form mentors and authentic learning contexts are also thought to be important (Mann et al. 2007).

Finally, Gordon found that overall self-assessment appeared more accurate in innovative learning environments providing opportunities to self-assess, systematic reconciliation between self and external assessments, and where there is an incentive for learners to self-assess (Gordon 1991). It should however be reiterated that the usefulness of improving self-assessment accuracy has not in itself been demonstrated (Colthart et al. 2008).

B. Continuing professional development

Conceptual developments and experimental findings pertaining to self-assessment are critical to continuing professional development. Eva and Regehr have argued for a radical change of paradigm in this area (Eva & Regehr 2008): instead of encouraging professionals to develop a mythical or at least problematic ability to self-assess, practitioners should be made aware that human beings are intrinsically poor self-assessors, and that they should actively seek external feedback when attempting to self-assess. Sargeant et al. have developed a similar argument in promoting what they call “directed” self-assessment (Sargeant et al. 2008). In their view, based on available data, self-assessment should be seen as a process of actively and repeatedly soliciting external feedback, comparing them with self-assessment and using both to direct learning and changes in practice. This process should be viewed as a social activity in which external guides can facilitate the reconciling of internal and external assessments. Without this reconciliation, negative external feedback is unlikely to be taken into account and accommodating self-assessments are unlikely to lead on their own to appropriate measures to fill gaps in knowledge/competence (Sargeant et al. 2008). Various audit and feedback initiatives aimed at improving practice have been tested (Duffy et al. 2008; Silver et al. 2008). The impact on practice appears to depend on the credibility of the source of feedback and on the intensity and duration of the initiative (Duffy et al. 2008; Epstein et al. 2008; Jamtvedt et al. 2006; Silver et al. 2008; Veloski et al. 2006). Innovative schemes using multisource feedback (using feedback from different sources such as supervisors, colleagues, and patients) have shown promising results (Lockyer 2003; Sargeant et al. 2008).

Finally Eva and Regehr (Eva & Regehr 2005) have argued that self-monitoring could have much more impact on practice than formal continuing professional development programs and have called for more research in this area.

VI. Conclusions

The concept of self-assessment has many definitions and refers to diverse theoretical frameworks. It is an extremely useful concept in medical education in view of the potential impact on learning and practice. The aspect of regulated practice should be further explored. From an educational perspective, feedback appears to be a crucial element of learning and some argue that the idea of completely independent self-assessment should be abandoned and replaced by a combination of self-assessment and active seeking of external feedback including once in professional practice.

Chapter 2: Professional self-concept of general practice trainees

Article published as “General practice as seen through the eyes of general practice trainees: a qualitative study”. Beaulieu MD, Dory V, Pestiaux D, Pouchain D, Gay B, Rocher G, Boucher L. Scandinavian Journal of Primary Health Care 2006;24(3):174-80.
http://www.informaworld.com/smpp/content~db=all?content=10.1080/02813430600795498

Abstract

Objective

To explore the perceptions of general practice trainees regarding their discipline and to compare these spontaneously expressed views with recently proposed definitions of general practice.

Material and methods

A qualitative focus-group study was conducted in one Belgian and two French medical schools. Twenty-eight trainees took part (16 from Belgium and 12 from France). The transcripts were analysed by the immersion crystallisation method.

Results

The participants in this study seemed prepared to take on the many responsibilities outlined in various definitions of general practice, but feared personal commitment to accessibility and continuous care. Being skilled clinicians and patients’ advocates formed their “raison d’être” in the healthcare system. They were reluctant to act as gatekeepers within the system, a role that might jeopardise their advocacy function for their patients. They mentioned the lack of appeal of entrepreneurship aspect of practice. Participants reported that training settings typically offer traditional

models of practice, which sometimes led them to feel estranged from a profession that they felt needs reorganisation.

Conclusions

Participants' descriptions generally coincided with official definitions of general practitioners' tasks, except for practice management and gate-keeping aspects. They were willing to accept the burden of general practice as long as responsibility could be shared and as long as there was freedom for flexible progress along a modern career track.

Key Points

- General practice organisations have revisited their definitions of the discipline as the basis for curriculum renewal in the European Community. Little is known about the fit between trainees' perceptions of general practice and the new definitions.
- Trainees feel that the clinical expertise needed to deal concurrently with common and complex problems is one key feature of general practice, along with the doctor–patient relationship.
- Social accountability and the gate-keeping function proposed in some definitions of general practice are seen as conflicting with general practitioners' accountability to patients.
- Trainees are exposed mainly to old models of practice, which fosters a sense of a mismatch between the idealistic representation of general practice found in most of the definitions proposed and the reality experienced by young physicians.

I. Introduction

General practice as a profession is under scrutiny in most industrialised countries. A growing proportion of newly trained general practitioners restrict their scope of practice (Bowler & Jackson 2002; Rowsell et al. 1995; Schweyer & Levasseur 2003; Van Baelen et al. 2001). Deteriorating working conditions (Baker et al. 1995; Sox 2003; Stevens 2001) and the greater value that society places on specialty practice (Freidson 2001; Iversen et al. 2002; Olesen et al. 2000) have been invoked as key factors responsible for this lack of interest in general practice. In an effort to bring the discipline to the forefront of the healthcare system, organisations of general practitioners in many European countries have revisited their definitions of general practice (Gay 1995; WHO regional office for Europe 1998; WONCA Europe 2002) (Table 1). These definitions now emphasise the key role of general practitioners as providers of first contact and comprehensive ongoing care for a wide spectrum of health conditions. They also introduce the notion of social accountability — the capacity to contribute to the efficiency of the healthcare system through gate-keeping — as a key asset, giving less attention to patient advocacy, the doctor–patient relationship, and a family orientation. In their provocative definition, Olesen et al. have even proposed that continuity of care is not a characteristic specific to general practice (Olesen et al. 2000). None of these definitions restrict the scope of general practice, and indeed some commentators have suggested that none propose a novel vision of the discipline (Baerheim & Rortveit 2002). In this context, it seems important to also explore the views of those who are about to embark on careers in the profession. Can these new definitions help to increase the attractiveness of general practice as a career in the eyes of its trainees? The redefinition of general practice is not merely a semantic exercise. According to Abbott's systemic view of professions (Abbott 1988), the capacity of a discipline to justify its claims for jurisdiction in a given professional system depends on its ability to clearly establish its role and the effectiveness of its interventions. Disagreement about roles among sub-groups within a given profession may lead to what

Abbott calls “internal differentiation,” which can jeopardise the strength of the profession. Although much has been published about medical students’ opinions of general practice as a career choice, few researchers have explored the views of general practice trainees as they prepare to enter the profession (Bowler & Jackson 2002; Rowsell et al. 1995; Schers et al. 2004; Schweyer & Levasseur 2003).

Table 1: Summary of the most recent definitions of general practice proposed by various European organisations

Source \ Concept	General[1]	Continuity of care	Comprehensive	First contact	Coordination of care	Family orientation	Social accountability	Patient advocacy	MD-patient relationship	Specific epidemiology	Practice management
WHO 1998	X	X	X	X	X	X	X				
Olesen et al. 2000	X		X	X			X	X			
WONCA-Europe 2002	X	X	X	X	X	X	X	X	X	X	X
CNGE 1995	X	X	X	X	X	X	X			X	
FAG 2001	X	X		X	X		X		X		

[1]General : refers to common and undifferentiated problems. WHO = World Health Organization. WONCA = World Organization of National Colleges and Associations in family medicine. CNGE = Collège National des Généralistes Enseignants (France). FAG = Forum des Associations de médecins Généralistes francophones (Belgique)

The idea for this study arose during work by three of us (MDB, D Pestiaux, and BG) on the French version of the WONCA (World Organization of Family Doctors) definition of general practice (WONCA Europe 2002). As practitioners and teachers in the discipline, we wondered if the vision

statements proposed by the various organisations of general practitioners would correspond to our trainees' vision of the profession and their proposed career paths.

We performed a qualitative study among European general practice trainees to explore their perceptions of the discipline and to compare these spontaneously expressed views with recently proposed definitions of general practice.

II. Material and methods

A. Design

We used a qualitative focus group approach, which allowed us to collect a wide range of points of view at reasonable cost in terms of both time and money. Focus groups also allow interactions and debate among participants, giving rise to rich discussions and a better understanding of the reasons underpinning opinions expressed (Krueger 1998).

B. Participants

The study was conducted in one Belgian and two French universities. Although general practice has been an established part of training in European medical schools for nearly 30 years, a mandatory 3-year training period in general practice was established only recently in these two countries. At the time the study was conducted, trainees could enter such programs either directly from university or after one or two years in autonomous practice to obtain accreditation as a "full-fledged" GP according to the new European standards. To be eligible to participate in this study, trainees had to be in the final year of their training program and had to have completed their rotation with a general practitioner.

In Belgium, all 92 final-year general practice trainees at the Université catholique de Louvain (UCL) were contacted by mail. The 20 respondents were all invited to participate, but 4 could not attend on the date set for the

focus group. For the French focus groups, volunteers were sought from a convenience sample of 20 residents working near the training hospitals of the Université de Créteil (Paris) and the Université Victor Segalen (Bordeaux), where the focus groups took place. Sampling was purposeful to ensure that the sample would include trainees coming either directly from university or from the practice setting, and a balance of men and women.

C. Conceptual framework and interview guide

The study was informed by Abbott's conceptual framework on the system of professions (Abbott 1988). In brief, the concept of professional tasks is central to this framework. It is through the professional tasks carried out by its members that a profession establishes its identity and its legitimacy. Professional tasks have both objective (located outside the professional system) and subjective foundations. The subjective foundations are most important and relate to the way the professionals within the discipline define their roles. In this study we focused on exploring trainees' representations of the tasks and roles of their discipline. We wanted to explore two dimensions of the professional roles: 1) the perceived roles of general practitioners in the healthcare system, 2) the trainees' views of their future careers in the discipline. We developed a semi-structured interview guide that explored first their vision of the discipline (the place of general practice within the healthcare system as a whole; what distinguishes the role of the general practitioner; how general practice relates to the other health professionals; and their perception of the stakes for general practice now); and how they envisaged their careers (what motivates them in general practice, what challenges them, how they saw their careers evolve).

D. Focus groups sessions

We held five focus groups in March and April 2004: three in Belgium, in communities where general practitioners affiliated with UCL host trainees (Brussels, Namur and Charleroi); one in Paris; and one in Bordeaux. Each 90-minute focus group was moderated by the same researchers (MDB and LB), who were not involved as faculty in any of the participating training

programs. During the focus groups, no official definitions of general practice were provided; as such, all opinions expressed were spontaneous.

E. Analysis

Because of our deep involvement in the issues under investigation here, we were concerned about potential biases that might affect our analyses. To ensure that these potential biases were minimised (Malterud 2001), the team included researchers from a variety of disciplines (e.g. LB, a social worker with experience in inter-professional collaboration; GR, a sociologist with a strong background in the sociology of professions), as well as a trainee in general practice (VD). We shared our views and hypotheses about the research questions. The transcripts were first analysed independently by all of the authors according to the immersion crystallisation method (Malterud 2001). Specific attention was paid to the words used, their context, and the internal consistency, frequency, extensiveness, intensity, and specificity of the comments (Krueger 1998). Emerging themes related to the two questions under study were identified. We took care to consider these themes from a variety of perspectives and to entertain competing interpretations.

III. Results

Twenty-eight trainees (18 women and 10 men[2]; mean age 28 years) participated. Ten of the participants had done a general practice rotation in an urban setting, 8 in a suburban setting, and 5 in a rural setting; 5 had been exposed to training in a variety of settings. Eleven had trained in a group practice and 17 in a solo practice[2].

[2] Corrected

A. Roles of the general practitioner

Four themes emerged (Box 1).

1. Capacity to deal with both common and complex problems

Participants saw the general practitioner as the only healthcare professional able to assume both first-contact care and the management of complex medico-psycho-social situations, as well as the integration of preventive care.

2. A skilled clinician

Participants described general practice as encompassing the clinical aspects of diagnosis and treatment, which they saw as the foundations of their skills; in particular, they noted that general practitioners must deal with undifferentiated problems, must manage problems in a context of uncertainty, without access to sophisticated investigative technologies, and must use watchful waiting as a diagnostic and therapeutic strategy.

3. Patient advocacy

Many participants felt that because of their skills, general practitioners represent one of the most efficient resources in the healthcare system. Still, most were uncomfortable with a gate-keeping role, which they saw as undermining their credibility in the eyes of patients and jeopardising their role in patient advocacy.

4. Continuing relationships with patients

Participants saw themselves as guardians of the patient's history. Hence, continuity of care was considered a unique characteristic. However, some participants noted that continuity of care need not be linked to an individual practitioner and that working arrangements ensuring access to one of a group of physicians would be a reasonable alternative. Following patients over time was seen as one of the most gratifying aspects of general practice.

Paradoxically, the high demands of patients were a source of concern about commitment to practice.

Box 1 : The discipline of general practice

Capacity to deal with both common and complex problems

"We're there on a day-to-day basis, for minor ailments, keeping in mind the more important ones. And mainly keeping in mind the prevention aspects of disease to try and protect [the patients]." (Participant B16)

A skilled clinician

"It's your nose, eyes and hands; that's it. You don't have all the equipment, but in the end you still have to make a decision: Are you going to send this patient for X-rays or not?" (Participant B15)

Patient advocacy

"I think patients should have the right to choose and if they want to see a specialist, they can see him directly, it's not a problem. What we really need to do is to promote the role of GPs so that patients will go to their GP of their own accord before going to see a specialist. That would create a two-tier system where people who can afford it will go directly to see a specialist whereas socially deprived patients will be forced to see their GP before they can see the specialist." (Participant B7)

Continuing relationships with patients: gratifying and demanding

"What I prefer in general practice is meeting with the person who shares with me bits of their life story, more than purely medical histories." (Participant N2)

B. Trainees' future careers as general practitioners

Three themes emerged (Box 2).

1. A flexible career

The most appealing aspect of general practice is its flexibility, which allows the physician to shape his or her career according to skills, interests, and personal situation.

2. A demanding career

General practice was also seen as demanding and inherently tough because of the isolation, the commitment required, the difficult experiences, and the demands of patients. This view was consistent with the opinion that it is impossible to decrease the breadth of the discipline, and hence decreasing the "burden" of availability to patients by joining a group practice or a network is the only solution. Most participants described their postgraduate experiences as determining factors in these perceptions. In most cases, training with general practitioners had provided positive experiences of continuity and fulfilling relationships with patients; however, other participants had felt a need for better balancing of work and personal life and, in some cases, the experience was clearly negative.

3. Lack of appeal of entrepreneurship aspect

Beginning a career in general practice was seen as both frightening and challenging. Doing locum work for a few years seemed to be the preferred path. Participants saw several advantages to this approach: gaining more experience; being exposed to different practices, which they anticipated would help them to clarify their career plans; and putting money aside before setting up practice. The few participants who spoke of the business side of general practice described feeling unprepared for this aspect.

Box 2 : The career of general practitioner

A flexible career

"There are as many ways of being a GP [as] there are GPs because each individual doctor has his own patient-base and his way of working depending on who he is." (Participant F8)

A demanding career

"In general practice, you can find yourself on your own all day, and you don't feel stimulated to progress. And then there's the flexibility it offers. It was harder for the older generation. I think working with others is enriching. It's tough on your own." (Participant B9)

The "entrepreneurship" aspect not appealing

"I can't see any positive aspects (to setting up practice); maybe I'm not down-to-earth enough… Purchasing equipment, finding a partner, doing the book-keeping, hiring a secretary, a cleaning lady, sorting out pay slips … it just seems insurmountable. That's not what medicine is about!" (Participant F3)

IV. Discussion

A. Principal findings

The participants in this study seemed prepared to take on the many responsibilities outlined in various definitions of general practice, but feared personal commitment to accessibility and continuous care. Being skilled clinicians and patients' advocates formed their "raison d'être" in the healthcare system. They valued highly the family orientation of general practice and the opportunity to develop long-term therapeutic relationships. Although they felt that general practitioners represent the cornerstone of the

healthcare system, they were uneasy about the notion of social accountability.

B. Strengths and weaknesses of the study

Focus group methodology was particularly appropriate here because, by permitting interaction, focus groups widen the range of responses and help participants to recall forgotten details. However, exploration of opinions can be superficial and the results are sensitive to group dynamics, a phenomenon known as “group censoring” (Krueger 1998). To avoid this phenomenon we systematically elicited comments from all participants at various points in the sessions. Many participants expressed negative opinions about general practice, which suggests that they felt at ease departing from the social norm. The participants expressed their views consistently and were often very specific about their personal experiences.

We took several measures to ensure that our personal biases did not interfere with the analysis. We shared our personal views and hypotheses at the beginning of the study. All focus groups were conducted by the same two researchers, MDB, who had no professional relationships with the respondents, and LB, a social worker by training. All transcripts were reviewed and analysed independently by each author, including GR, a sociologist with no relationship with general practice academic settings.

This exploratory study was conducted in a specific context and with a limited number of participants. It is important to remember, however, that qualitative research like our study does not aim for representativity of participants to some reference population. Rather, our objective was to document a diversity of opinions and to identify patterns among those opinions (Kuzel 1999). As such, we recruited informants with different experiences and from different geographic areas. No new themes emerged during the fifth group, which confirmed saturation. Obviously, there is a need to replicate such studies in different contexts, given the known impact of university structures and policies on attitudes of trainees toward primary care (Block et al. 1996;

Block et al. 1998; Colwill 1992; Kutob et al. 2003; Martini et al. 1994). However, the fact that similar observations have been reported in studies of comparable groups of respondents in France (Levasseur & Schweyer 2004) and other European countries (Bowler & Jackson 2002; Rowsell et al. 1995; Schers et al. 2004) suggests that some of these opinions are universal.

C. Contribution of the study to current knowledge

This study adds to the still-scattered body of knowledge on the vision that general practitioners entering the profession have of their discipline. The importance of the doctor–patient relationship and continuity of care as major sources of gratification conforms with previous observations from the United Kingdom (Bowler & Jackson 2002; Rowsell et al. 1995) and the Netherlands (Schers et al. 2004). Fear of commitment to a practice early in one's career and worries about growing infringement of the state on professional autonomy have also been reported from Britain (Bowler & Jackson 2002; Rowsell et al. 1995) and France (Levasseur & Schweyer 2004). It is interesting that trainees from different countries had some common views on their careers as general practitioners. Although this study was limited in terms of number of sites, its exploratory nature has allowed broader insight than most related surveys conducted to date.

D. Implications and further research

Our findings confirm the importance of exploring the vision that future general practitioners have of their discipline in the context of efforts by the profession to redefine its roles and jurisdictions. This is particularly true for European countries, which have the additional challenge of finding a common voice for a profession that is more dependent on workplace organisation than any other medical specialty. Clearly, replication of our study in a large variety of contexts is the only way to distinguish universal from context-specific perceptions.

The apparent coherence between trainees' perceptions of general practice and official discourse should be interpreted cautiously. Two areas should be

explored further. The first is the tension between participants' idealised perceptions of general practice and their experiences. Training experiences were determinant in this regard, offering both positive and negative models of coping with the strains of practice (Jordan et al. 2003; Lublin 1992; Martini et al. 1994). This finding is consistent with a study of Belgian general practitioners in group practice, in which general practice trainees described this generation gap with their older colleagues in negative terms (Feron et al. 2003).

The second is the balance between social accountability and patient advocacy. Social accountability often appears in the forefront of new definitions of general practice. However, taken too far, this focus on containing costs and managing the system efficiently could estrange both practitioners and patients, who strongly value the clinical and communications functions of general practice (Baker et al. 1995; Grol et al. 2000). There is potential here for profound dilemmas between utilitarian and deontological views of professional ethics, but our respondents did not comment in depth on this apparent contradiction. Further exploration of this phenomenon is warranted.

Chapter 3: The development of self-efficacy beliefs during general practice vocational training

Article published as “The development of self-efficacy beliefs during general practice vocational training: an exploratory study”. Dory V, Beaulieu MD, Pestiaux D, Pouchain D, Gay B, Rocher G, Boucher L. Medical Teacher 2009;31(1):39-44.
http://www.informaworld.com/smpp/content~db=all?content=10.1080/01421590802144245

Abstract

Introduction

Retention of general practitioners (GPs) is crucial to ensure appropriate primary care. However, some recently qualified GPs feel unprepared for practice, which may lead them to leave the profession or restrict their scope of practice. The development of self-efficacy beliefs during vocational training may be an important factor in this phenomenon.

Methods

Five focus groups with a total of 28 GP trainees and recent graduates were conducted in Belgium and France. Initial analysis using the immersion-crystallisation method was followed by analysis using Bandura’s self-efficacy framework.

Results

Participants described beginning their training with low self-efficacy beliefs. Most participants described how they overcame stressful situations. Some, however, seemed to be developing avoidance strategies. Successfully resolving patient problems, sharing experiences with peers and receiving positive feedback from supervisors, colleagues and patients were conducive to the development of positive self-efficacy beliefs.

Discussion

Although low self-efficacy beliefs are natural at the beginning of training, participants seemed to develop in two ways, either overcoming their fears or avoiding them. Identifying the pattern of trainees' responses to allow tailoring of interventions should be investigated by those who run training programs. Interventions could include reassurance, peer interaction and an appropriate degree of autonomy.

Practice points

- Substantial numbers of GP trainees doubt their ability and many recently trained GPs fail to set up practice.
- Self-efficacy beliefs influence career choices and commitment to those choices
- Low self-efficacy beliefs are common at the beginning of training.
- Most trainees overcome the challenges posed by high-stress situations and thus develop stronger self-efficacy beliefs, some develop avoidance strategies.
- Receiving positive feedback and sharing anxieties with peers help residents to develop positive self-efficacy beliefs.

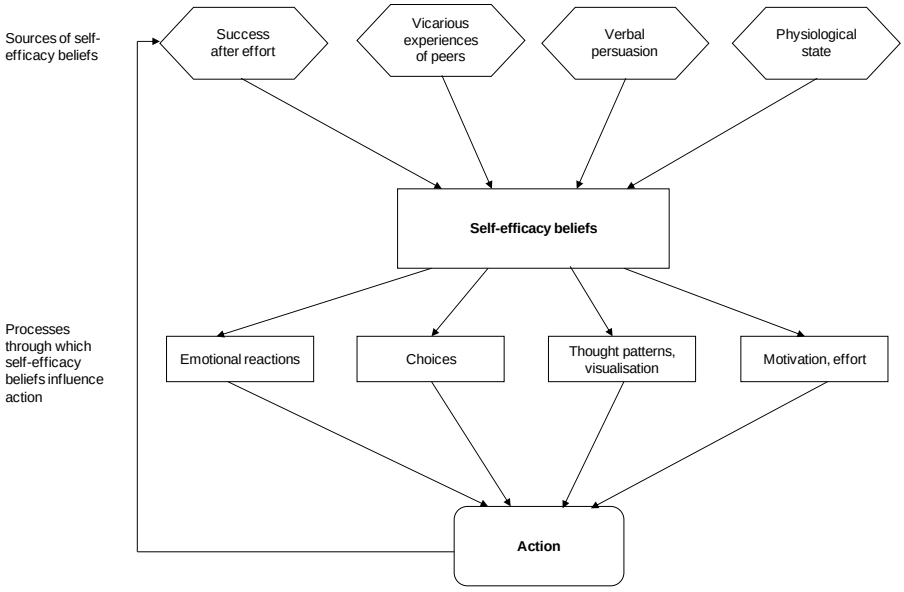
I. Introduction

Recruitment and retention of general practitioners (GPs) is a growing concern (Colwill 1992; Kmietowicz 2001; MacKean & Gutkin 2003; Rosser 2002; Sullivan 2002; Van Baelen et al. 2001; Whitcomb & Cohen 2004). Many GPs are choosing to restrict their practice (e.g. to locum work, emergency practice, preventive services or occupational medicine) (Baker et al. 1995; Levasseur & Schweyer 2004). A recent survey in the United Kingdom showed that morale among working GPs was low, with 25% wanting to leave the profession (Kmietowicz 2001). In Belgium, one-third of GPs leave the profession within 5 years of completing their training (Van Baelen et al. 2001). Complaints voiced by GPs include heavy workload, lack of financial rewards, increased patient demands and burdensome administrative tasks (Baker et al. 1995; Huby et al. 2002; Kmietowicz 2001; Sox 2003). In addition, a survey of general practice registrars in the United Kingdom found that some trainees felt unprepared for their future role (Rowsell et al. 1995). Although Kramer et al. found that the self-reported confidence of general practice residents increased during their postgraduate training (Kramer et al. 2007), others have found high prevalences of anxiety and depression in this group (Earle & Kelly 2005; Oriel et al. 2004), with a third of residents displaying what is known as the “impostor phenomenon” (Oriel et al. 2004). This term relates to feelings of inadequacy among high-achieving individuals who believe that their successes are due to luck and that they are in fact frauds. At the time of the study (Oriel et al. 2004), these residents believed that they would not be able to practice after residency, but whether they later chose to restrict their practice or leave the profession altogether is as yet unknown.

More broadly, self-efficacy beliefs can be defined as an individual’s beliefs about his or her capabilities to produce designated levels of performance (Bandura 1994; Kaufman 2003). These beliefs, which can influence events in the person’s life, stem from his or her own experiences of success (especially of overcoming obstacles), the vicarious experiences of peers,

verbal persuasion and physiological states (Bandura 1994; Kaufman 2003). They influence effort and persistence in actions through cognitive, motivational and affective processes, as well as through the choices that individuals make (Bandura 1994; Kaufman 2003) (figure 1). In theory these beliefs could therefore play a part in the retention of GPs.

Figure 1: Bandura's self-efficacy theory (Bandura 1994). This figure was developed from Bandura's textual descriptions



In most countries, medical training, even for future GPs, focuses on the hospital setting. Indeed, training in the community represents at most 3 of the 9 to 10 years it takes to train a GP. Yet, general practice is inherently a community-based practice and is therefore a very different type of medicine from that to which medical students are primarily exposed. This poses specific challenges for both trainees and trainers in general practice, but little is known about how self-efficacy beliefs develop during training. To date, the literature on self-efficacy beliefs in medical education has focused mainly on improving students' and practitioners' confidence in dealing with specific medical tasks (Blok et al. 2004; Katz et al. 2005; Mason & Ellershaw 2004)

rather than on broader considerations, such as the way these beliefs develop during training. The objective of the study was to explore the trainees' vision of general practice and their career opportunities; and subjective preparedness for practice (self-efficacy beliefs). Findings on how participants viewed general practice as a discipline and as a career have been reported elsewhere (Beaulieu et al. 2006). This article reports our analysis of self-efficacy beliefs at the end of postgraduate training.

II. Methods

A. Design

A qualitative method, specifically focus groups, was chosen because of the exploratory nature of the study. Focus groups allow for debate and rich discussions with reasonable time expenditure.

B. Sample

The study was conducted in Belgium and France. The study population consisted primarily of trainees in their final year of general practice training. To be eligible for the study, a trainee should have completed a rotation with a GP. Sampling was also purposeful in terms of training settings and gender. For the focus groups conducted in Belgium, we invited all 92 final-year general practice residents training at the Université catholique de Louvain individually by mail. Seminar supervisors were contacted to encourage trainees to take part in the study but we did not send reminders nor did we phone trainees prior to consent. Twenty agreed to take part. Sixteen were free on the dates the focus groups took place. For the focus groups conducted in France, volunteers were sought from a convenient sample of residents and recently qualified GPs working near the teaching hospitals of the Université de Créteil (Paris) and the Université Victor Segalen (Bordeaux), where the interviews took place. The sample population was extended in France because most postgraduate training in that country is done in hospitals, with many young GPs using locum jobs in their first years to "finalise" their training. Two-thirds of those contacted agreed to take part.

Supervisors were not informed of trainee participation in the study.
Results in Belgium and France were very similar and saturation was reached after five focus groups.

C. Interview guide

We allowed participants as much freedom as possible to explore factors influencing their preparedness for practice. The following questions were among those used to elicit discussion: “How do you feel now that you are on the verge of entering the profession?”, “What challenges do you feel you face?”, “How has your training prepared you for practice?”,“What anxieties, if any, do you feel?”, “What do you think are your resources?”. We also encouraged spontaneous descriptions of specific and important experiences.

D. Focus groups

A total of five focus groups (three in Belgium and two in France) were held in March and April 2004; those held in Belgium took place first. Each focus group was moderated by the same researchers (M.D.B. and L.B.). Participants were not acquainted with the moderators. Participants were encouraged to discuss their opinions in a non-adversarial fashion, and efforts were made to ensure that everyone contributed to the discussion.
Focus groups were observed by one to three other researchers. In four of five focus groups, one of the observers was a member of the faculty where the participants were training. Faculty members were not, however, involved in trainee assessment.
Post-session debriefings between the researchers who attended the focus group were held after each focus group (Krueger 1998). The focus groups and the debriefing sessions were audiotaped and transcribed.

E. Analysis

The transcripts were first analysed independently by three of the authors (M.D.B., V.D. and L.B.) according to the immersion-crystallisation method (Borkan 1999). This technique involves repeated cycles where researchers immerse themselves in the data to first find emerging themes then

progressively discover possible hypotheses for the findings and finally link them with theoretical frameworks from the available literature. Specific attention was paid to the words used, their context, and the internal consistency, frequency, extensiveness, intensity and specificity of the comments (Krueger & Casey 2000). These three researchers reached consensus on a preliminary analysis. This initial analysis spurred one of these researchers to suggest using the self-efficacy framework (Figure 1) to further interpret the data. The other authors (D. P., D. P., B.G. and G.R.) each read the transcripts and the report of the preliminary analysis independently. The seven researchers brought various perspectives to the analysis according to their expertise and experience: general practice (M.D.B., D. P., D. P., B.G.), social work (L.B.), sociology (G.R.) and training in general practice (V.D.).

Ethical approval was granted by the ethics committee of the Cliniques Universitaires Saint-Luc of the Université catholique de Louvain.

III. Results

Twenty-eight individuals (24 final-year trainees, one second-year trainee and three recently qualified GPs) participated in the study, 16 in Belgium and 12 in France. Groups included four to seven participants each. The average age was 28 years, and 18 of the participants were women. Ten participants were trained in an urban setting, eight in a suburban setting and five in a rural setting; five had been exposed to training in a variety of settings. Eleven were trained in a group practice and 17 in a solo practice[3] (table I).

Participants described their self-efficacy beliefs as developing in two stages: incompetent beginnings and training as a potential path to mastery. Findings are reported with reference to the self-efficacy framework (figure 1). The focus groups were conducted in French, and participants' comments were

[3] Corrected

translated by V.D. Citations are labelled by focus group in Roman numerals followed by Arabic numerals for participant number.

Table I: Characteristics of participants in focus groups of general practice trainees in Belgium and France.

		Belgium (n = 16)	France (n = 12)	Total (n = 28)
Age, y (range)		27.5 (26-43)	28.5 (25-34)	28 (25-43)
Gender	Male	6	4	10
	Female	10	8	18
Level of training	Resident	16	9	25
	Recently qualified	0	3	3
Training setting	Urban	3	7	10
	Rural	5	0	5
	Suburban	7	1	8
	In several settings	1	4	5
	Solo practice	11	6	17
	Group practice	5	6	11

A. Incompetent beginnings: low self-efficacy beliefs and their sources (stage 1)

Participants described the beginning of their practical training in general practice as an experience of their own incompetence: they were constantly faced with novel situations for which they did not know what action to take. This was generally seen as a direct consequence of their graduate training being too theoretical. A few felt overwhelmed by the requirements of general practice, the breadth of the discipline, and feelings of responsibility toward their patients. Some stated that patients had unrealistic expectations of the

GP. This lack of experiences of success and the indirectly negative verbal persuasion from patients led to initially low self-efficacy beliefs.

> *I started my training on a Sunday, on-call. I was completely freaked out! Somebody called asking for a throat spray. And I was thinking, throat spray, what throat spray? It was silly. It's about the practical details. (III-3)*

> *In the community, there's the way a patient presents, the whole of the doctor-patient relationship dimension. All of that stuff is huge. It's so stressful! (IV-5)*

> *That's something that's really unsettling when you start. It's as if GPs are supposed to know everything there is to know in medicine. (I-2)*

> *I was surprised to discover just how demanding patients can be about small things. They really want you to go into the detail. They ask questions, they nitpick, they're very demanding. I was a little surprised. Your reputation is quickly made. (II-1)*

B. Training as a potential path to mastery: the evolution of self-efficacy beliefs: effects of initially low self-efficacy beliefs, actions taken and their consequences on self-efficacy beliefs at the end of training (stage 2)

For a few participants, this experience was highly emotional and frightening. Others were much more matter-of-fact about the subject and described it as an inevitable stage in their professional development. Participants described their coping strategies. Although a few had opted for avoidance strategies, most had adopted more constructive ways to deal with their initial difficulties**.** One strategy was to modify their own expectations of themselves. Some participants described this as a conscious decision, whereas for others, changes in expectations were linked to experiences of sharing anxieties with peers.

I'm not interested enough in the purely medical side to do general practice. I think I would tend to refer, and, well, that's just not right. It's not a GP's role to say,"ok, you have something, but get it sorted out elsewhere." That's the great barrier I feel to practising as a GP. (I-4: participant who was not planning to pursue a career in general practice)

When you graduate, it's not that you know nothing, but you don't know much. That's why I chose to go back to hospital for my final year because I needed to glean more information, I needed to keep learning, to feel more knowledgeable. (I-5)

What I enjoy in these seminars is I feel reassured. It makes me realise we're all in the same boat. I'm no more incompetent that anyone else. (II-7)

You can't know everything. It's just not possible. Even after fifty years of practice, there are things I taught my supervisor and he said "Oh really? I didn't know that!" So I guess you never know everything. (I-2)

Two participants described situations when they were left unsupervised and simply had to cope on their own. These experiences, though stressful at first, had provided them with the motivation to "get on with it" and had in the end given them the confidence in their own ability to practice effectively.

For two and a half months I managed the practice on my own. The first week I was completely stressed out! So I asked an older colleague in the area if he would give me advice if I needed it. And in the end I managed. I used my phone a lot to call consultants, colleagues, or medical school friends. But I learned a great deal. If I hadn't had this period, I wouldn't have had this strength and maybe I

would have gone back to working in a hospital. I really improved. (I-1)

Participants described how they tended to seek help from other GPs or, more often, from specialist colleagues, and were thus constantly developing their competencies, finally arriving at a stage where they felt they could handle any situation, albeit sometimes by seeking information or referring the patient. Participants found their motivation in their sense of responsibility towards patients.

There are always areas where you feel less able. So you have to deal with them. If there's a problem, you call a colleague even if he's a consultant and you tell him you've got a problem. I've never hesitated to pick up my phone when there was something I didn't know. And if the consultant's unsure, he'll just say "Send [the patient] to me" or "Get him to the emergency department immediately". Everyone knows we all have weaknesses in certain areas. We just compensate for the patient's sake. (II-2)

Participants then described receiving positive feedback from colleagues, from their supervisors and even from patients. In the end, most participants felt that postgraduate general practice training had prepared them for practice, although some still felt anxious about beginning their own practice in earnest.

Getting outside advice from somebody who's more experienced, it really helps. Especially when you think "I would do this, but am I right?" and the consultant tells you to do just that. Then you really gain confidence. That's how I learned a lot. (I-2)

Just this week, two patients came to see me just for an explanation regarding their specialist results. And I wondered why they had come to me. I'm not able to answer a specialised question, but

obviously the consultant hadn't listened to them. I think when they left, they had learned something. I don't know; maybe I took the time and helped them understand better. (III-1)

IV. Discussion

A. Main findings

In this study, we built on research about preparedness for medical practice using Bandura's self-efficacy framework (Bandura 1994; Kaufman 2003). Our findings indicate that this is an appropriate framework for research about medical training. Participants' descriptions of the development of their self-efficacy beliefs followed Bandura's self-efficacy model very closely**.** Our results suggest that self-efficacy beliefs evolve in two stages during the course of postgraduate training. All the general practice trainees who took part in this study experienced initial feelings of incompetence when they started their postgraduate training. The start of practical training is a time when low self-efficacy beliefs can be expected because trainees cannot yet rely on their or their peers' experience. This phenomenon is perhaps exaggerated in general practice, as trainees in this discipline cannot transfer experiences of success in hospital clerkships to their new professional context. It could be said that this is an inevitable part of early training, and indeed most trainees took this view.

Participants' descriptions of their coping strategies, in terms of choices made (avoidance strategies or persistence), cognitive processes (modifying expectations of themselves), affective processes (anxiety) also followed the Bandura model, as did the effects of their actions on experiences of success (personal and vicarious) and positive verbal persuasion from colleagues and patients and thus on their self-efficacy beliefs at the end of training. One important finding was the apparent split between two types of emotional and cognitive reactions, with most trainees "getting on with it" while others displayed anxiety and doubts about their ability to become competent practitioners, a result concordant with findings of anxiety and depression among residents (Earle & Kelly 2005; Oriel et al. 2004). The factors

determining which trainees will have which reaction is unclear from our data and could be explored in further studies.

B. Reflection on the methodology

For this exploratory study, which was intended to provide a basis for further research, we chose a qualitative methodology. Focus groups can help participants to develop their thoughts and recall forgotten experiences, but they can also lead to group censoring (Krueger & Casey 2000). We believe that such was not the case in this study, as we specifically elicited opinions from less vocal participants; furthermore, very different experiences were reported, including negative experiences and personal limitations, which participants might not have been keen to disclose in an unfriendly environment. The fact that participants were very specific about past experiences strengthens our findings (Krueger & Casey 2000). Participants in the Belgian focus groups were volunteers from the whole class of final-year trainees. Only 20 of 92 trainees invited agreed to take part. We cannot assess in which way they differed from the whole class. It is possible that participants who had negative experiences were more prone to accept our invitation. However, views expressed within the Belgian focus groups were very diverse and we believe that we elicited a broad array of opinions which is the aim of exploratory qualitative research. Saturation was reached in the final focus group, which confirmed the breadth of our findings (Krueger & Casey 2000). We strove for reflexivity and enriched the analysis by including researchers from different backgrounds in the investigator group (Malterud 2001). The sample, although balanced for gender and training environment, was limited to participants from three universities in two countries; further studies should be conducted to confirm the findings in these and other countries.

V. Conclusions

Even if the relationship between strong self-efficacy and engagement in a GP career with the full scope of practice is yet to be established, our results

suggest that some GP trainees may experience difficulties in the development of self-efficacy during their training. Some of these difficulties may be more specific to general practice where there is a greater discrepancy between knowledge acquired in medical school and the realities of general practice. Patient expectations, especially of the breadth of competence of their GP, may also impose greater pressure on trainees.

Further research is needed on the development of self-efficacy beliefs during medical training, and on effective educational strategies. Our findings point to some that could be useful in this area and merit further investigation. First, trainees should be reassured that feeling incompetent is natural at the beginning of training and should not be interpreted as indicating actual incompetence. Verbal persuasion from supervisors could be crucial in this regard, and if this finding were to be confirmed, supervisor training should take it into account. Peer interaction also seems to have positive effects. Finally, the granting of appropriate autonomy could be an important motivating factor in the development of strong self-efficacy beliefs. The exact level of autonomy required by different trainees is still unclear. Although some trainees may thrive in low-supervision situations, others may develop excessive anxiety. Identifying these latter trainees and developing ways to allow them to experience autonomy without frightening them out of general practice could also be the focus of further studies.

Chapter 4: Factors associated with feelings of competence in general practice trainees

Submitted to Medical Teacher as “Factors associated with feelings of competence in general practice trainees”. Dory V, Degryse J, Vanpee D, Roex A.
Medical Teacher is available online at: http://informahealthcare.com/mte

Abstract

Introduction
General practice vocational training aims at producing competent physicians who will practice independently, i.e. trained GPs who demonstrate adequate levels of competence but also adequate levels of self-perceived competence.

Methods
We conducted a cross-sectional study of general practice trainees enrolled at Université catholique de Louvain in 2005. The independent variable was self-perceived level of competence in four clinical domains. The dependent variables included gender, postgraduate year, patient-contacts, on-call duties, practice of specific tasks, self-assessed effort and knowledge.

Results
127 of 169 trainees took part (75%). Depending on the clinical domain, 20.5% to 76.4% assessed their competence as good, very good or excellent. These proportions of trainees were not linked to volume, type of practical experience, nor knowledge. There were links to gender and self-assessed effort.

Discussion

Across domains, a significant proportion of trainees reported less than satisfactory levels of self-perceived competence. This confirms previous findings. Volume of experience did not explain this phenomenon. Type of experience and deliberate practice might be more relevant to self-perceived competence. The cross-sectional nature of the study limits its interpretation. Longitudinal studies should be conducted as well as qualitative studies focusing on the role of other factors in the development of high levels of self-perceived competence during general practice training.

Practice points

- Independent practice is likely to require not only actual competence but also self-perceived competence.
- Self-perceived competence levels were not satisfactory for a significant proportion of our GP trainees, a finding consistent with other studies.
- Self-perceived competence was not linked to volume of experience nor to postgraduate year.
- Other factors influencing self-perceived competence should be looked into and might include characteristics of supervision and feedback.

I. Introduction

General practice has been a speciality in the European Union for over 20 years (Council Directive 86/457/EEC 1986). Specific vocational curricula have been developed. In 2005, the European Academy of Teachers in General Practice (EURACT) published its Educational Agenda (EURACT 2005) in line with WONCA (World Organization of Family Doctors)-Europe's new definitions of general practice (WONCA Europe 2002). It outlines the learning outcomes of specific training based on the core competencies required of general practitioners. In its 2003 Declaration on Specific Training in General Practice/Family Medicine in Europe, the European Union of General Practitioners (UEMO) states that "The purpose of training for general practitioners is to produce a doctor who has obtained a level of clinical competence sufficient for independent practice" (UEMO 2003). Independent practice however may not be solely linked to competence. Bandura has shown that one of the principal determinants of human agency is an individual's self-efficacy beliefs (Bandura 1997). These are an individual's beliefs about his or her capabilities to produce designated levels of performance on a specific task. Strong beliefs in one's capacity to perform the task successfully have been found to be conducive to achievement. These beliefs are specific to the task and context and have a dynamic nature. Hence if the objective of vocational training in general practice is to produce individuals who will indeed practice independently, than it should not only strive to develop trainees' competencies but also their belief in their ability or self-perceived competence. Actual and self-assessed ability have been shown to be poorly correlated (Colthart et al. 2008; Davis et al. 2006; Gordon 1991). Therefore one cannot be used to predict the other. The studies by Oriel et al. (Oriel et al. 2004) and Dory et al. (Dory et al. 2009) have suggested that some general practice/family medicine trainees feel incompetent, and the authors have speculated that this may lead to a proportion of vocationally trained practitioners not setting up practice or restricting their scope of practice. While this has not been demonstrated, the problem of retention of recently trained practitioners has been shown to be

an issue (Baker et al. 1995; Kmietowicz 2001; Levasseur & Schweyer 2004; Van Baelen et al. 2001) and perceived lack of competence may be one explanation among others. General practice/family medicine may have distinct characteristics as a specialty in regards to self-perceived competence. Mastery experiences are central to the development of strong self efficacy beliefs (Bandura 1997). Most of the trainees' clinical experience occurs in secondary or tertiary hospital settings, at least until postgraduate education. Furthermore, the breadth of scope of general practice and the uncertainties linked to diseases presenting at an earlier undifferentiated stage may hinder the development of perceptions of competence for the scope of tasks required of general practitioners.

The aim of this study was to measure self-perceived competence in a cohort of postgraduate trainees in general practice at our university to assess the proportion of trainees who have a satisfactory level of self-perceived competence and to identify the determinants of self-perceived competence. The following potential determinants were examined based on a review of the literature: gender (some have found that men tend to be more confident than women (Colthart et al. 2008)), experience and level of training (Harrell et al. 1993; van Leeuwen et al. 1997; Violato & Lockyer 2006), self-assessed effort and actual knowledge (Kramer et al. have found that effort and growth of knowledge were predictive of growth of self-perceived competence (Kramer et al. 2007)). In a qualitative study, Dory et al. (Dory et al. 2009) found that stressful situations specifically could lead to increased self-efficacy beliefs; we therefore hypothesised that the volume of on-call experience might also be important.

In Belgium, the medical curriculum is seven years long. The final year is an elective year so that students who select the general practice track obtain one year's credit for vocational training. Most students therefore require two postgraduate years to complete the three year general practice program. These two years are usually spent in a general practice setting although students may select a hospital post for a maximum duration of one year.

II. Methods

A. Participants

All trainees enrolled in the general practice postgraduate curriculum at Université catholique de Louvain, Belgium, were requested to take part in a return day on campus for the study in the morning and seminars in the afternoon.

B. Self-perceived competence

Participants were asked to assess their competence in four domains: chest, urogenital system, locomotor system and dermatology. We hypothesised that their may be differences of self-perceived competence in different areas but we were wary to maintain a certain breadth as decisions regarding their future practice would likely be influenced by broad judgements. Each domain was briefly described. The benchmark was described as the general practitioner in practice. There was an ordinal 7 point-scale for each domain. Each point was anchored using a descriptor, ranging from 1 (very poor) to 7 (excellent).

C. Other variables

Students were given a questionnaire on background variables which included: gender, postgraduate year, average number of patient-contacts per day in a general practice setting (6 categories), number of week-end days spent on-call in a general practice setting since the beginning of their postgraduate training (5 categories), frequency of opportunities to practice various specific tasks (3 categories), and effort exerted for training (4 categories). The specific tasks we asked them about were meant to indicate practice profile in terms of activities that not all general practitioners practice in Belgium. We selected tasks that were relevant to the domains assessed such as cervical smears, minor surgical interventions, minor trauma care, intra-articular injections, spirometry, and electrocardiography (ECGs). Knowledge in each domain was assessed in a formative written test. The test comprised 159 extended-matching items selected from an

interuniversity database in Flanders, the Dutch-speaking region of Belgium. Items had been validated for use in formative and summative assessment of clinical reasoning in general practice postgraduate trainees in Flanders (Degryse 2003). General practice in the Dutch and French-speaking parts of Belgium is extremely similar so revalidation was not deemed necessary. Items were chosen to cover the four domains: 42 items for chest, 41 for urogenital system, 42 for locomotor system and 34 for dermatology. Total score and scores on subdomains were calculated as percentages of correct answers. Reliability of scores was measured using Cronbach's alpha.

D. Analysis

For purposes of analysis, satisfactory levels of self-perceived competence were defined as good, very good or excellent (or 5 to 7 on the 7-point scale). We dichotomised data in order to compute odds ratios of satisfactory levels of self-perceived competence in participants who saw an average of more than 10 patient-contacts a day, who had spent more than 10 days on-call, who had had regular opportunities (at least once a month) to practice the various tasks, and who had exerted significant effort in training.

Spearman correlations were computed to assess the relationship between self-perceived competence (using the seven-point score) and knowledge for each domain (using the percentage correct score). True (disattenuated) correlations were computed taking into account the reliability of the scores on the knowledge test.

E. Ethical considerations

The authors were not involved in the participants' training and assessment. We stressed to participants that individual data would not be available to faculty members involved in their training and assessment nor to their clinical supervisors.

III. Results

A. Participants

127 of 169 trainees took part (75%). Participant characteristics are reported in table I.

Table I: Participant characteristics

Background variable		Number of participants (%) n=127
Gender	Male	45 (64.6)
	Female	82 (35.4)
Postgraduate year	PGY1	50 (39.4)
	PGY2	77 (60.6)
Average number of patient-contacts per day in a general practice setting	0 (hospital post)	11 (8.7)
	1-5	9 (7.1)
	6-10	39 (30.7)
	11-15	40 (31.5)
	16-20	20 (15.7)
	more than 20	8 (6.3)
Number of week-end days spent on-call in a general practice setting	0 (hospital post)	11 (8.7)
	1-5	20 (15.7)
	6-10	36 (28.3)
	11-15	23 (18.1)
	more than 15	37 (29.1)
Opportunities for regular practice	Cervical smear	19 (15.0)
	Minor surgical interventions	69 (54.3)
	Minor trauma care	25 (19.7)
	Intra-articular injection	33 (26.0)
	Spirometry	25 (19.7)
	ECG	104 (81.9)
Effort exerted for training	0=no effort	0 (0.0)
	1=little effort	11 (8.7)
	2=moderate effort	73 (57.5)
	3=significant effort	43 (33.9)

B. Levels of self-perceived competence (table II)

Table II: Levels of self-perceived competence

Number of participants (%) / Level of competence	Uro-genital	Chest	Dermatology	Locomotor
Very poor, poor, or mediocre (1-3)	26 (20.5)	2 (1.6)	48 (37.8)	30 (23.6)
Fair (4)	67 (52.8)	28 (22.0)	53 (41.7)	56 (44.1)
Good, very good, or excellent (5-7)	34 (26.8)	97 (76.4)	26 (20.5)	41 (32.3)

The proportion of participants whose self-perceived competence was satisfactory (i.e. good or very good, 5-6 with no participant rating his/her competence as excellent, 7, in any domain) ranged between 20.5% for dermatology and 76.4% for chest. This proportion was significantly different between chest and the other domains and between dermatology and locomotor system.

C. Determinants of self-perceived competence (tables III and IV)

More men had satisfactory levels of self-perceived competence than women in the chest and locomotor domains. Levels of satisfactory self-perceived competence were no higher for trainees in their second year of postgraduate training than those in their first. Trainees who saw over 10 patients a day in a general practice setting were not more likely to attain satisfactory levels of self-perceived competence. Those who had spent over 10 days on-call in a general practice setting were more likely to perceive themselves as competent in the locomotor domain but not in others. Specific practice profile was not linked to higher levels of self-perceived competence in related domains. Trainees who felt they had exerted significant effort in training

were more likely to feel competent in three of the four domains. Self-perceived competence was not correlated to performance on the written test. Partial correlations were computed controlling for the hypothesised variables. They were non-significant.

Table III: Determinants of satisfactory self-perceived competence

Odds ratios (95% CI) of satisfactory levels (5-7) of self-perceived competence	Uro-genital	Chest	Dermatology	Locomotor
Male	1.7 (0.7-3.7)	**3.5 (1.2-9.9)**	1.2 (0.5-2.9)	**6.1 (2.7-13.8)**
Postgraduate year 2	1.1 (0.5-2.4)	1.0 (0.4-2.4)	2.6 (1.0-7.0)	0.8 (0.4-1.6)
More than 10 daily patient contacts in a GP setting	**3.9 (1.6-9.6)**	1.4 (0.6-3.3)	2.3 (0.9-5.8)	0.5 (0.2-1.0)
More than 10 week-end days on-call in a GP setting	1.4 (0.6-3.0)	0.6 (0.3-1.4)	1.4 (0.6-3.3)	**2.3 (1.1-4.9)**
Regular opportunities to practice cervical smears	1.8 (0.6-4.9)			
Regular opportunities to practice ECGs		1.1 (0.4-3.3)		
Regular opportunities to practice spirometry		1.3 (0.4-3.9)		
Regular opportunities to practice minor surgical interventions			1.6 (0.7-3.9)	
Regular opportunities to practice minor trauma care				1.2 (0.5-3.0)
Regular opportunities to practice intra-articular injections				1.1 (0.5-2.4)
Significant effort exerted in training	**2.2 (1.0-4.9)**	**4.4 (1.4-13.5)**	1.3 (0.5-3.1)	**2.2 (1.0-4.8)**

Table IV: Relationship between self-perceived competence and domain knowledge

Observed and true (disattenuated) Spearman correlations between self-perceived competence and domain subscore on the written test (95% CI)

The reliability of each subscore is indicated as Cronbach's alpha.

	Uro-genital α=0.596	Chest α=0.613	Dermatology α=0.676	Locomotor α=0.753
Observed	0.044 [-0.132 to 0.216]	-0.026 [-0.200 to 0.149]	0.117 [-0.058 to 0.285]	-0.001 [-0.175 to 0.173]
True	0.057 [-0.171 to 0.280]	-0.033 [-0.255 to 0.190]	0.142 [-0.071 to 0.347]	-0.001 [-0.202 to 0.199]
p-value	p=0.626	p=0.77	p=0.19	p=0.99

IV. Discussion

A. Main findings

Our main finding was that a significant proportion of postgraduate trainees perceived their competence as less than fair (between 1.6% and 37.8% depending on the domain). A previous qualitative study (Dory et al. 2009) had already suggested that some individuals fail to develop strong self-efficacy beliefs during training although the proportion in this study is striking. This should not be taken to mean that they are not actually competent. Self-assessment is known to be inaccurate (Colthart et al. 2008; Davis et al. 2006; Gordon 1991). Oriel et al. (Oriel et al. 2004) described a high proportion of impostor feelings in family medicine trainees. By definition, impostor feelings are feelings of incompetence in individuals that others judge as competent. The reasons behind this lack of self-perceived competence remain unclear. While personal psychological reasons may be at its heart (e.g. the impostor phenomenon (Oriel et al. 2004), high levels of anxiety (Earle & Kelly 2005), self-concept (Gordon 1991)), training programs may also have a role to play. It has been suggested that medical training by and large fosters learned helplessness (Bond 2007) although this has yet to be demonstrated.

Levels of self-perceived competence were high in one clinical domain, i.e. chest. The difference between this domain and the others was statistically significant. The reasons for this observed difference is however unknown. Respiratory and circulatory problems are common in general practice (Britt et al. 2002). They are also addressed in several courses across the medical curriculum. The broad nature of the domain may also mean that trainees were able to conjure up many well known diseases when assessing their level of competence which may not have been the case for the other more specific domains.

Levels of satisfactory self-perceived competence were no different in postgraduate trainees in their first and second year. This contradicts findings by Kramer et al. of a growth of self-perceived competence in general practice trainees in the Netherlands (Kramer et al. 2007). The cross-sectional nature of the study means that this finding could simply be the result of a cohort effect, i.e. that the cohorts of trainees from their first and second year were somehow inherently different. Only a longitudinal study could clarify this. Another explanation could be the timing of the study. It was conducted in June so that first-year trainees were in fact at the end of their first year. Perhaps the most notable levels of growth of self-perceived competence had already occurred, during their first few months of training. A study by Marel et al. (Marel et al. 2000) showed that for most skills junior doctors had increased levels of confidence between the first and second-year of postgraduate training and not in the subsequent year.

Another intriguing finding was that levels of self-perceived competence were not linked to volume of experience. Mastery experiences are known to be important for the development of self-efficacy beliefs (Bandura 1997) and this has been demonstrated in the medical arena for instance in self-efficacy beliefs related to requesting organ donation (Blok et al. 2004). Qualitative data in the same population suggest that specific experiences, e.g. striking experiences, experiences in stressful circumstances, were important (Dory et al. 2009). The nature of the experiences might therefore be more important than volume. Furthermore the deliberate practice literature may be useful to shed light on this finding. According to Ericsson et al., while amount

of practice is a necessary condition for the development of competence, it is not enough to attain expertise. The deliberate nature of practice is what is important (Ericsson 2004). Deliberate practice requires purposefulness, a drive to constantly improve one's performance. This is usually facilitated by external feedback and coaching (Ericsson 2004). While deliberate practice seems crucial to attaining expert levels of competence, its impact on self-perceived competence is unknown. Positive feedback is however known to strengthen self-efficacy beliefs (Bandura 1997). The supervisor's role may in this respect be crucial.

B. Strengths and limitations

The high participation rate and compulsory nature of the day's activities suggest that our sample should be representative of our population. Data regarding non-participants were not available to allow comparison of the two groups. The data pertain to a single cross-sectional snapshot of general practice trainees at one university. They should be followed by longitudinal monitoring of self-perceived competence and replicated in other settings if they were to be generalised.

We asked trainees to assess their competence in four general domains. Other studies have looked at confidence for specific tasks (Blok et al. 2004; Blumenthal et al. 2001; Katz et al. 2005; Nomura et al. 2008; Wiest et al. 2002). Such confidence ratings may be more specific although our aim was to examine perceived confidence in respect to future practice decisions which are likely to depend on broad judgements.

Variables pertaining to practice and effort were all self-reported. They may not have reflected reality accurately. Furthermore whilst participation in the day's activities was compulsory, the purpose of the survey was clearly stated as research. Participants appeared conscientious when filling in the questionnaire and sitting the exam (e.g. they all sat the exam until they had completed it or until time was up). Only 6 participants (4.7%) of participants gave the same rating for self-perceived competence in the four domains suggesting at least an attempt to discriminate between domains.

C. Further research

While such quantitative data are useful to confirm exploratory qualitative studies and to demonstrate the importance of the problem, they are unable to give us deep understanding into the process. Further qualitative studies could be conducted, in particular to analyse the role of the supervisor in groups of confident and underconfident trainees. Finally, the role of underconfidence in the career choices of recently trained general practitioners has yet to be demonstrated by a longitudinal study.

V. Conclusions

The proportion of general practice trainees with satisfactory levels of self-perceived competence was low in this study. Whilst the reasons for this require further studies, our findings confirm the fact that such perceptions are widespread. Volume of experience was, in line with findings from the deliberate practice literature, insufficient to explain the phenomenon. We suggest that further research into the role of other factors including supervision and feedback during vocational training should be conducted. Finally, whilst the self-efficacy literature suggests that such beliefs may be an important cause for concern in training programs, especially in a profession where retention is a problem, longitudinal studies should seek to confirm the “prognosis” of low levels of self-perceived competence.

Chapter 5: Usable knowledge, hazardous ignorance - beyond the percentage correct score.

Article to be published as “Usable knowledge, hazardous ignorance - beyond the percentage correct score”. Dory V, Degryse J, Roex A, Vanpee D. Medical Teacher. In press.
Medical Teacher is available online at: http://informahealthcare.com/mte

Abstract

Background
Little attention has been paid to metacognitive ability of medical students.

Aims
We used confidence marking to explore certainty of knowledge and ignorance.

Method
127 of 169 general practice trainees took part. Students sat a written MCQ test. Each answer was followed by a degree of certainty judgement. Answers attributed a high degree of certainty were used to compute overall usable knowledge and hazardous ignorance and proportions of knowledge that is usable and of ignorance that is hazardous. The former variables were analysed according to MCQ score, year of training and gender.

Results
At a group level, the mean amount of usable knowledge on the MCQ was 21.13%, mean amount of hazardous ignorance on the MCQ was 5.21%, mean proportion of knowledge that was usable was 36.57%, mean proportion of ignorance that was hazardous was 14.32%. There were no significant differences between highest and lowest quartiles of MCQ score,

nor according to year of training. Men had higher levels of ignorance that is hazardous.

Conclusions

A third of trainees' knowledge was partial. A sixth of their ignorance was hazardous. Confidence marking can aid formative assessment and could potentially be implemented into summative assessments.

Practice points

- Measuring metacognitive ability of medical students is relevant
- Confidence marking allows testing of certainty of knowledge
- The proportion of partial versus usable knowledge is substantial
- Students' misconceptions, i.e. amount of hazardous ignorance may be a cause for concern
- In this study, metacognitive ability was not linked to performance on a written test nor to postgraduate year but men had higher levels of hazardous ignorance.

I. Introduction

Self-regulation is an essential component of medical professionalism (Medical Professionalism Project 2002). Doctors should be able to monitor their performance if they are to practice safely and effectively. Metacognition is "knowing about knowing" and refers to the mental processes used to monitor and control our mental processes (Nelson & Narens 1994). Self-assessment is one such process. There has been a huge amount of interest in self-assessment in the health professions, synthesised in several published reviews and a recent BEME (Best Evidence in Medical Education) Guide on the topic (Colthart et al. 2008; Davis et al. 2006; Gordon 1991). Most of the literature on self-assessment has studied self-assessment as the basis for determining one's learning needs (Eva & Regehr 2005). The BEME guide chose to define self-assessment as "a personal evaluation of one's professional attributes and abilities against perceived norms" (Colthart et al. 2008). In these studies the onus has generally been on accuracy of self-assessment. Results have generally been disappointing in this respect (Davis et al. 2006; Gordon 1991). Correlational studies have shown Pearson or Spearman's coefficients of around 0.3. Furthermore, several studies have found that individuals who perform better tend to also be more accurate self-assessors with poor performers tending to be least accurate (Colthart et al. 2008; Davis et al. 2006). This effect cannot be wholly attributed to effects of regression to the mean (Albanese et al. 2006). Studies regarding the influence of gender on self-assessment ability have shown variable results, either suggesting a tendency for men to be more overconfident than women or no difference (Colthart et al. 2008).

Ward et al. (Ward et al. 2002) have argued that poor self-assessment measurements in many studies may in part reflect poor methodology for measurement rather than actual poor self-assessment ability. Group-level analyses may miss individuals who are very accurate self-assessors. General self-assessment tasks may lead to misunderstandings both of the assessed task and of calibration of the measure (Tousignant & DesMarchais 2002). Regehr et al. (Regehr et al. 1996) have developed the "relative

ranking model" where participants must rank tasks according to their self-assessed strength in the task, allowing for analysis on an individual level. Studies using this model have shown variable results (Harrington et al. 1997; Regehr et al. 1996; Reiter et al. 2002).

Eva and Regehr (Eva & Regehr 2005) have however suggested that the concept of self-assessment should be clarified. They refer to the type of summative self-assessment described above as "reflection-on-practice" which is important to self-directed learning and continuing professional development. They suggest that another type of self-assessment may be worthy of more attention: "reflection-in-practice". This type of self-assessment is much more specific and is concurrent to, embedded in daily practice, in each clinical encounter. The types of judgement involved are for example "Am I confident that my diagnosis is correct or should I order a test?" "Am I sure this patient's treatment is adequate or should I change it?". Safe practice requires doctors to be able to self-limit accurately. Effective practice requires them to be appropriately confident, thus avoiding unnecessary tests, wasting time looking everything up, or creating anxiety in patients faced with an uncertain doctor.

The growing interest in self-monitoring in clinical practice warrants that similar attention be given to self-monitoring in medical education. Up until now, little attention has been paid to metacognition in medical education. Strategies have been developed to limit guessing in exams but there has not been a clear agenda to assess metacognitive processes as such in examinations. Currently, students generally get credit for giving more right answers than wrong answers. No difference is made between a misconception, where the student thinks he/she is right when he/she is not, and an unlucky guess. Similarly, no difference is made between what some refer to as knowledge versus partial knowledge (Khan et al. 2001). We sought to test the hypothesis that trainees with more knowledge also have better metacognitive ability. Confidence marking has the potential to explore accuracy and decisiveness in metacognitive judgements in assessments. In this exploratory study, we submitted general practice trainees to a written

test of clinical reasoning and asked them to indicate their degree of confidence for each answer. We used these degrees of certainty to measure the proportion of usable knowledge, i.e. correct answers in which trainees were highly confident, and the proportion of hazardous ignorance, i.e. wrong answers in which they were highly confident, in different groups of trainees.

II. Method

A. Population

The study population consisted of postgraduate trainees in general practice. Trainees have completed their medical degree and therefore have extensive experience of learning and indeed of testing. They have also received extensive feedback on the results of their learning. They should therefore have highly developed metacognitive strategies. All postgraduate general practice trainees at the Université catholique de Louvain (UCL), Belgium, were required to take part in an on-campus day of learning activities, including the study test, in June 2005. Trainees from both years of our postgraduate curriculum took part.

B. Written test

An extended-matching multiple choice question (MCQ) examination was developed using items from an interuniversity database in Flanders, Belgium. Items had been validated for use in formative and summative assessment of clinical reasoning in general practice postgraduate trainees in the Dutch-speaking part of Belgium (Degryse 2003). General practice in the Dutch and French-speaking parts of Belgium is extremely similar so revalidation was not deemed necessary. Items were chosen to cover four areas of general practice: chest, uro-genital system, locomotor system and dermatology. The test consisted of 159 items, 42 for chest, 41 for uro-genital system, 42 for locomotor system and 34 for dermatology. Total score was calculated as percentage of correct answers.

C. Measurement of confidence

Participants were asked to give a degree of confidence for each item of the MCQ test they answered. Each item in the paper questionnaire was followed by a scale. The scale we used comprises 7 unequal intervals with a percentage score at its centre. Research in human discriminative ability generally and in self-assessment has shown that scales that have a number of points close to "the magical number 7" are most useful (Hunt 1982; Leclercq 1993; Miller 1956) The scale is symmetrical with wider intervals at the centre of the scale and narrower intervals at the extremes. The scale reflects research that showed that adults discriminate degrees of certainty more accurately in extreme values (Leclercq 1993). The percentage scores in the intervals are: 2%, 10%, 25%, 50%, 75%, 90%, 98%.

D. Background variables

Prior to testing, participants were asked to complete a questionnaire regarding socio-demographic variables and training background.

E. Analysis

Usable knowledge was defined as the percentage of answers that were both correct and that had been attributed a high level of confidence i.e. 90% or 98%. Khan et al. used the term usable to describe any knowledge that was assigned a high level of confidence whether it was correct or incorrect (Khan et al. 2001). We use the term knowledge to refer to correct, well-informed knowledge and ignorance for incorrect knowledge.

Hazardous ignorance was defined as the percentage of answers that were both incorrect and attributed a high level of confidence i.e. 90% or 98%.

The two variables were calculated for all trainees and for trainees in the highest and lowest quartiles of performance on the MCQ.

These variables are not independent of number of correct and incorrect answers (and thus with the score on the MCQ test). Trainees who performed better on the MCQ test, i.e. those with the highest proportion of correct answers, are likely to also have higher proportions of usable knowledge and

lower proportions of hazardous ignorance simply because of the fact that they had more correct answers and fewer incorrect answers.

We therefore computed two other variables: the proportion of knowledge that is usable (i.e. that is attributed a confidence degree of 90 or 98%) and the proportion of ignorance that is hazardous (i.e. that is attributed a confidence degree of 90 or 98%). A comparison was made between the means of these two variables for trainees in the highest and lowest quartiles of performance on the MCQ using Student's t-test. These proportions were computed to test the hypothesis that more knowledge is correlated with better metacognitive ability and therefore more decisiveness in confidence attribution. We therefore expected the proportion of usable knowledge within knowledge would be higher for trainees in the highest quartile on the MCQ test and that they would display lower proportions of hazardous ignorance within their ignorance.

The same calculations were computed for gender and postgraduate year.

Statistical analysis was done using SPSS® version 16 (www.spss.com).

F. Ethical considerations

The authors were not involved in the participants' training and assessment. We stressed to participants that individual data would not be available to faculty members involved in their training and assessment nor to their clinical supervisors.

III. Results

A. Participants (table I)

127 trainees took part out of a total of 169 enrolled in the program (75.1%). Because of the compulsory nature of the day's activities, reasons for absence were assumed to be due to genuine inability to attend although this cannot be ascertained with any certainty. Available data for comparison between participants and non-participants were limited; differences in terms of gender and postgraduate year were not statistically significant.

Table I: Participant characteristics

Background variable		Number of participants (%) n=127	Number of non-participants (%) n=42	Statistical significance of difference (p-value)
Gender	Male	45 (35.4)	16 (38.1)	0.90
	Female	82 (64.6)	26 (61.9)	
Postgraduate year	PGY1	50 (39.4)	13 (31.0)	0.43
	PGY2	77 (60.6)	29 (69.0)	
Average number of patient-contacts per day in a general practice setting	0 (hospital post)	11 (8.7)		
	1-5	9 (7.1)		
	6-10	39 (30.7)		
	11-15	40 (31.5)		
	16-20	20 (15.7)		
	more than 20	8 (6.3)		
Number of week-end days spent on-call in a general practice setting	0 (hospital post)	11 (8.7)		
	1-5	20 (15.7)		
	6-10	36 (28.3)		
	11-15	23 (18.1)		
	more than 15	37 (29.1)		
Opportunities for regular practice (>once a month)	Cervical smear	19 (15.0)		
	Minor surgical interventions	69 (54.3)		
	Minor trauma care	25 (19.7)		
	Intra-articular injection	33 (26.0)		
	Spirometry	25 (19.7)		
	Electrocardiography	104 (81.9)		

B. Written test

The mean score on the MCQ was 57.90% (SD 9.79). The average score of subjects in the lowest quartile was 44.09%. The average score of subjects in the highest quartile was 68.74%.

Reliability was assessed using Cronbach's alpha. Scores on the whole MCQ were very reliable (0.867).

C. Level of confidence (figures 1, 2 and 3)

The mean percentage of usable knowledge was 21.13% (SD 12.76).

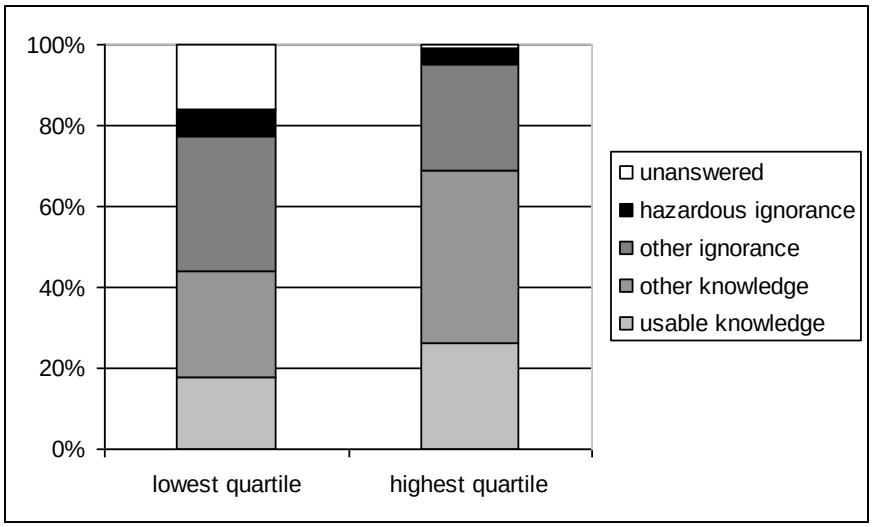
The mean percentage of hazardous ignorance was 5.21% (SD 5.44).

The mean percentage of knowledge that was usable was 36.57% (SD 21.15).

The mean percentage of ignorance that was hazardous was 14.32% (SD 14.47).

The mean difference in the two former variables between trainees according to performance on the MCQ score (highest versus lowest quartile) and according to year of training (first versus second) was not statistically significant ($p>0.05$). There was however a statistically significant difference in terms of gender: men displayed more ignorance that is hazardous (18.74% versus 11.89%, $p=0.011$).

Figure 1: Average proportions of types of knowledge and ignorance of subjects in the lowest and highest quartiles of performance on the written test



Usable knowledge = number of correct answers attributed a 90 or 98% confidence level *100 / number of items

Other knowledge = number of correct answers attributed another level of confidence *100 / number of items

Hazardous ignorance = number of incorrect answers attributed a 90 or 98% confidence level *100 / number of items

Other ignorance = number of incorrect answers attributed another level of confidence *100 / number of items

The figure illustrates that whilst proportions of all knowledge and all ignorance are different in both groups (i.e. their scores are by definition different), the proportions of knowledge that is usable and of ignorance that is hazardous are not significantly different.

Figure 2: Average proportions of types of knowledge and ignorance of male and female participants

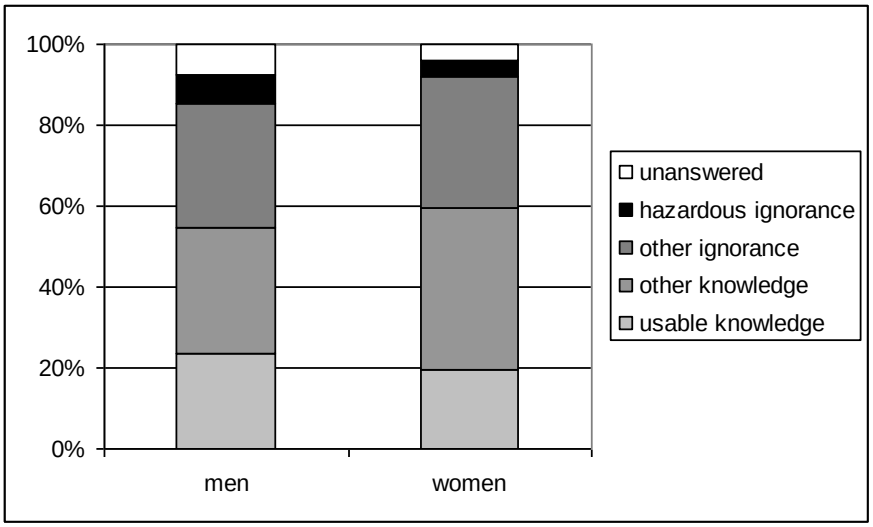
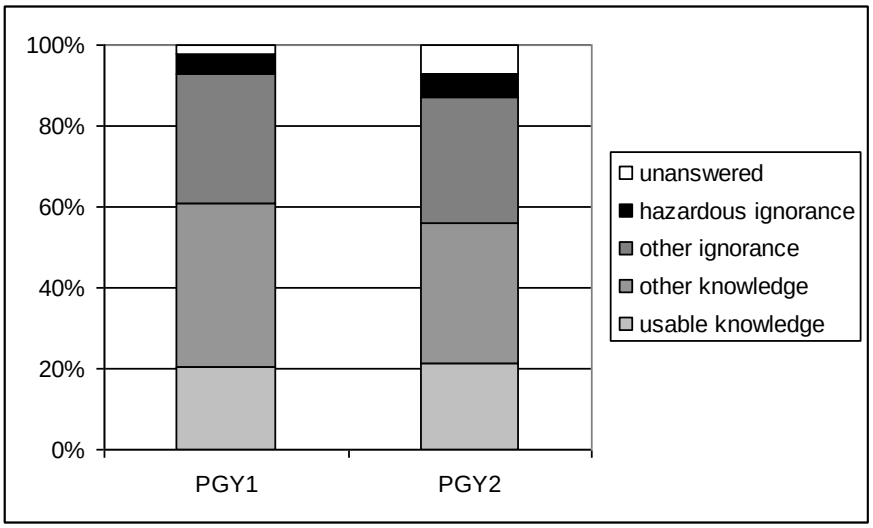


Figure 3: Average proportions of types of knowledge and ignorance of subjects in their first and second year of training



IV. Discussion

Around two thirds of knowledge that trainees displayed in the written test was only partial. Around a sixth of ignorance was hazardous, i.e. attributed a high level of confidence. There was no difference in these measures between participants in the highest and lowest quartile of performance on the written test nor between participants in their first and second year of training. Men had a higher proportion of ignorance that is hazardous. This particular finding is consistent with several studies indicating that men tend to be more overconfident than their female counterparts (Colthart et al. 2008).

Group-level correlational studies of self-assessment have been criticised from methodological and conceptual stand-points. Ward et al. (Ward et al. 2002) have demonstrated flaws in the paradigm of such research, including the potential for group level analysis to miss individual differences in self-assessment ability and problems with use of scale and anchoring. Eva and Regehr (Eva & Regehr 2005) have argued that the major problem in research up until now has not only been on the methodological level, but also on the conceptual level, with the sole focus being on summative self-assessment or "reflection-on-practice". While summative self-assessment may be linked to personality or global self-concepts (Gordon 1991), concurrent self-assessment, or "reflection-in-action" may reflect complex and specific metacognitive processes of monitoring which may be more relevant to daily patient care. Whilst we have not found studies measuring the impact of self-assessment ability on patient outcomes, their argument is convincing. It is easy to imagine that overconfident doctors may diagnose/treat erroneously when they should have e.g. sought more information or referred the patient. Conversely, underconfident doctors may order too many tests or excessively refer patients, increasing the burden on restricted resources and potentially harming patients by unnecessary yet sometimes hazardous tests. In the search for valid measures of reflection-in-practice, they have recently studied psychology undergraduates in a computer-based general knowledge

test (Eva & Regehr 2007). They evaluated response times and “passing” in relation to correctness of answers and suggest that these measures provide evidence of adequate self-assessment.

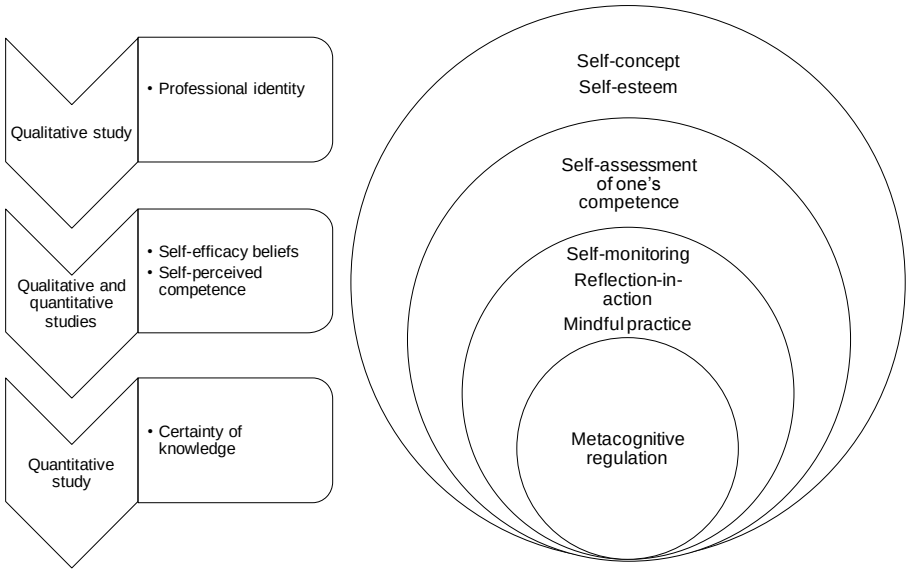
Confidence marking could be a useful measurement of metacognitive ability of medical students. Up until now, it has mostly been used to discourage guessing using negative marks to correct the score. This approach can improve reliability but validity may be hindered by the systematic bias it introduces (students’ score and ranking becomes dependent on their risk taking profile and test-wiseness as well as their knowledge of the answer) (Burton 2002; Muijtjens et al. 1999). However, used as distinct measures from the test score, it provides information beyond the percentage of answers correct and allows teachers and students themselves to gauge their overall level of partial versus certain knowledge and level of ignorance versus hazardous misconceptions. In this study the amount of partial knowledge was considerable as was the amount of potentially hazardous errors. While the results of this particular study are limited to one cohort of general practice trainees at one university, these findings are consistent with other studies (Burton 2002) and should be cause for concern to educators. Misconceptions in particular should be targeted for feedback to trainees and remediation suggested (Khan et al. 2001). Further studies should be conducted in other cohorts, other specialities and other institutions to assess the generalisability of our findings before use of these measures for summative purposes.

V. Conclusions

Students could be assessed not only on clinical reasoning and progress of clinical reasoning, but also on their ability to judge their reasoning. We believe that renewed use of confidence marking could be a useful tool for feedback and potentially for summative assessment.

Conclusions

In the context of reform and renewal of general practice, we chose to study the process of professionalisation of general practice trainees.
In order to frame our questions, we developed a model of the different levels of self-assessment and studied their perceptions accordingly:



1. Professional identity

How do general practice trainees perceive general practice, the role of general practitioners, and how do they envision their future career? Are these perceptions in line with official definitions? Does postgraduate training provide them with relevant role models?

2. Perceived competence

Do general practice trainees feel competent? How do these feelings evolve during training? How has postgraduate training contributed to their feelings

of (un)preparedness for practice? What are the determinants of perceived competence?

3. Level of usable knowledge in general practice

Do general practice trainees possess adequate levels of usable knowledge relevant to their future practice? Are they able to assess their application of knowledge adequately?

We sought to study their professional self-concept in order to determine whether the professional identity of future general practitioners was in line with the new definitions of general practice. We explored to what extent our postgraduate residency program offered relevant role models in this respect. We also examined their levels of self-perceived competence and self-efficacy beliefs, hypothesising that low levels in these areas may hinder their ability to practice independently and hence contribute to the observed trend of recently trained general practitioners leaving the profession or restricting their scope of practice. We studied the role of practical training in regards to the development of levels of self-perceived competence. Finally, we looked at their levels of usable knowledge as another key indicator of their ability to practice independently and at their ability to self-assess their knowledge accurately as an indicator of self-monitoring ability.

These different types of self-perceptions represent different levels of self-assessment. We included a synthesis of the conceptual definitions of self-assessment and of its implications in medical education. This project is an example of how the study of self-assessment can provide valuable insights into a curriculum, in this case into the postgraduate general practice curriculum, and its products.

I. Main findings

A. Professional self-concept (chapter 2)

In the qualitative study we found that participants perceived their future professional role as clinical, patient-centred, and of coordination. These perceptions were in agreement with recent definitions of general practice.

They valued doctor-patient relationships and took on board the comprehensive and continuous nature of general practice. In doing so however, they were acutely conscious of the heavy burden of these duties, and of potential tensions with their aspirations for adequate work-life balance. The overwhelming majority of participants felt that group practice was a key element in solving this conundrum.

Their view of the roles of general practitioners seemed consistent with their trainers' views. Nevertheless they described significant friction when it came to views relating to the organisation of practice. Many trainers still work long hours in single-handed or small group practices. This may lead trainees to reject this enactment of general practice or cause them to feel estranged from the profession.

Trainees differed from official definitions in one respect: social accountability and more specifically gate-keeping. They felt that their primary responsibility was towards the individual patient and were wary of being perceived as an agent of the state rather than as a patient's advocate. This concern is a valid one for a profession trying to strike a balance between demonstrating its value to society as a whole and to individuals. In working for increased recognition within the political arena, general practice should not lose sight of its core business: caring holistically for individuals within their family context.

B. The development of self-efficacy beliefs (chapter 3)

In the same study, we also explored readiness for autonomous practice framed as self-efficacy for practice. We examined the dynamic development of these beliefs during training. We found that all participants had begun their postgraduate training with low self-efficacy beliefs. Most had however

developed strong self-efficacy beliefs over the course of their training. The processes involved included a reappraisal of norms, positive feedback from supervisors, consultants and patients, and overcoming stressful situations autonomously. A few participants continued to demonstrate low self-efficacy beliefs and some envisaged leaving the profession. It was unclear from our data as to why these participants did not follow the same trend as their peers.

C. The determinants of self-perceived competence (chapter 4)

In an effort to clarify the training variables that might determine the levels of self-perceived competence of trainees, we undertook a cross-sectional survey of all trainees enrolled in the program in 2004-2005. 127 trainees (75%) took part in the survey.

Depending on clinical domain, 20.5 to 76.4% of participants assessed their competence as good or very good, 22.0 to 52.8% as fair, and 1.6 to 37.8% as mediocre, poor or very poor. We found no relationship between level of self-perceived competence and postgraduate year, nor with practice profile. The relationship between self-perceived level of competence and average daily number of patient contacts and number of on-call duties was not consistent. In other words volume of experience was not the main determinant of self-perceived competence. There was however a relationship between levels of self-perceived competence and perceived effort exerted in training except for dermatology.

We discussed hypotheses regarding other potential determinants of self-perceived competence. Type of experience may be more relevant than amount of experience. Perhaps challenging experiences are critical. The expertise literature suggests that deliberate practice, i.e. with a conscious effort to strive for continuous development and fine-tuning of one's competencies and with adequate coaching, may be crucial to the attainment of expert competence. In the qualitative study, feedback and adequate progression towards autonomy appeared to be important factors in the development of self-efficacy beliefs. Supervisors may therefore have a

crucial role which we did not explore in the quantitative cross-sectional study.

D. Usable knowledge (chapter 5)

The cross-sectional survey included a written test of clinical knowledge in four areas of general practice. Confidence marking was used to study the level of usable knowledge of trainees, i.e. knowledge of which they were certain.

The mean percentage of usable knowledge was 21.29% (SD 12.67). The mean percentage of knowledge that was usable was 36.86% (SD 20.98). There was no relationship between these variables and year of postgraduate training. Students who performed better on the written test did not have a higher proportion of knowledge that was usable suggesting that confidence and competence are indeed distinct concepts. Renewed use of confidence marking may be a valuable way to measure metacognitive ability and to provide richer feedback.

II. Implications and suggestions for further research

Whilst of an exploratory nature, our study of the different levels of self-assessment of general practice trainees provides useful insights into postgraduate general practice training and the process of professionalisation.

Our trainees generally conceived their future role in accordance with current definitions of general practice. Socialisation into the profession appeared to be successfully developed. They were however adamant that providing the scope and continuity of care of general practice while maintaining work-life balance requires a reorganisation of practice with group practice at its core. We need to be aware that this vision, whilst supported by our academic centre, is not universally supported nor indeed modelled by many of our affiliated supervisors. This may lead to feelings of estrangement from the profession or even rejection of the profession as modelled by supervisors. Supervisor selection should take this into account.

Most trainees acquired adequate levels of self-efficacy beliefs and self-perceived competence. A significant minority did not. This should be a cause for concern. While longitudinal studies are needed to determine whether this minority goes on to leave the profession or restrict its scope of practice, further qualitative studies could explore the reasons why these individuals do not develop strong self-efficacy beliefs. Seminars based on peer-group case discussions seemed to have a positive influence on self-efficacy beliefs as did positive feedback from supervisors. Amount of experience as such was not found to be crucial although qualitative data suggest striking experiences may be relevant. Perhaps personal psychological reasons are behind this phenomenon. Even so, identifying and developing strategies to help these trainees should be explored further. More generally, the potential role of deliberate practice and the role of supervisors in the development of self-efficacy beliefs during training could be examined. This would be an important element to take into account in supervisor training.

Finally, from an assessment perspective, our study of usable knowledge in general practice trainees illustrates how confidence marking could be used to provide deeper insight and potentially richer feedback in relation to trainees' clinical knowledge and metacognitive regulation ability. Links with self-efficacy beliefs and the impostor phenomenon were not studied although this may provide useful avenues for the identification of trainees who lack appropriate confidence.

We examined the self-assessment of general practice trainees at various levels: the general level of professional self-concept, the intermediate level of self-perceived competence and self-efficacy beliefs, and the specific level of metacognitive regulation. These studies revealed valuable insights into the future general practitioners that our centre is producing and into our curriculum. In its aim to train autonomous professionals, postgraduate training should not limit its focus on developing competence. Further studies and avenues for improving our postgraduate curriculum were discussed. Supervisors and supervisor training may be a key piece in this complex puzzle.

Supplementary material: Recent definitions of general practice/family medicine

In 1998 the WHO described general practice as “general, continuous, comprehensive, coordinated, collaborative, and family and community oriented”.

In 1995 the French National College of Teaching General Practitioners (CNGE) enounced its own principles of general practice:

1. a patient-centred approach
2. family and community orientation
3. a scope of activity defined by patients’ needs
4. unselected and complex health problems
5. low incidence of severe illnesses
6. high incidence of diseases presenting at an early stage
7. simultaneous treatment of multiple complaints and diseases
8. continuity of care
9. coordination of care
10. efficiency

Olesen et al. (Olesen et al. 2000) defined general practice in a high profile article in the British Medical Journal in 2000:

“The general practitioner is a specialist trained to work in the front line of a healthcare system and to take the initial steps to provide care for any health problem(s) that patients may have. The general practitioner takes care of individuals in a society, irrespective of the patient's type of disease or other personal and social characteristics, and organises the resources available in the healthcare system to the best advantage of the patients. The general practitioner engages with autonomous individuals across the fields of prevention, diagnosis, cure, care, and palliation, using and integrating the sciences of biomedicine, medical psychology, and medical sociology.”

In 2001 the French-speaking Belgian Forum of General Practice Associations (FAG) stated the 7 functions of the general practitioner:

1. Healthcare provider
2. Communicator
3. Synthesis
4. Central agent of a healthcare network
5. Community health agent
6. Continuity of care, on-call duties and emergencies
7. Business manager

In 2002, WONCA-Europe defined the discipline, speciality and core competencies of general practice. These definitions were revised in 2005:
General practice / family medicine is an academic and scientific discipline, with its own educational content, research, evidence base and clinical activity, and a clinical specialty orientated to primary care.

i. The characteristics of the discipline of general practice/family medicine are that it:
a) is normally the point of first medical contact within the health care system, providing open and unlimited access to its users, dealing with all health problems regardless of the age, sex, or any other characteristic of the person concerned.
b) makes efficient use of health care resources through co-ordinating care, working with other professionals in the primary care setting, and by managing the interface with other specialities taking an advocacy role for the patient when needed.
c) develops a person-centred approach, orientated to the individual, his/her family, and their community.
d) has a unique consultation process, which establishes a relationship over time, through effective communication between doctor and patient
e) is responsible for the provision of longitudinal continuity of care as determined by the needs of the patient.

f) has a specific decision making process determined by the prevalence and incidence of illness in the community.
g) manages simultaneously both acute and chronic health problems of individual patients.
h) manages illness which presents in an undifferentiated way at an early stage in its development, which may require urgent intervention.
i) promotes health and well being both by appropriate and effective intervention.
j) has a specific responsibility for the health of the community.
k) deals with health problems in their physical, psychological, social, cultural and existential dimensions.

ii. The Specialty of General Practice / Family Medicine

General practitioners/family doctors are specialist physicians trained in the principles of the discipline. They are personal doctors, primarily responsible for the provision of comprehensive and continuing care to every individual seeking medical care irrespective of age, sex and illness. They care for individuals in the context of their family, their community, and their culture, always respecting the autonomy of their patients. They recognise they will also have a professional responsibility to their community. In negotiating management plans with their patients they integrate physical, psychological, social, cultural and existential factors, utilising the knowledge and trust engendered by repeated contacts. General practitioners/family physicians exercise their professional role by promoting health, preventing disease and providing cure, care, or palliation. This is done either directly or through the services of others according to health needs and the resources available within the community they serve, assisting patients where necessary in accessing these services. They must take the responsibility for developing and maintaining their skills, personal balance and values as a basis for effective and safe patient care.

iii. The Core Competencies of the General Practitioner / Family Doctor

A definition of the discipline of general practice/family medicine and of the specialist family doctor must lead directly the core competencies of the general practitioner/family doctor. Core means essential to the discipline, irrespective of the health care system in which they are applied.

The eleven central characteristics that define the discipline relate to eleven abilities that every specialist family doctor should master. They can be clustered into six core competencies (with reference to the characteristics) :

1. Primary care management (a,b)
2. Person-centred care (c,d,e)
3. Specific problem solving skills (f,g)
4. Comprehensive approach (h,i)
5. Community orientation (j)
6. Holistic approach (k)

As a person-centred scientific discipline, three additional features should be considered as essential in the application of the core competences:

a. Contextual: Understanding the context of doctors themselves and the environment in which they work, including their working conditions, community, culture, financial and regulatory frameworks.

b. Attitudinal: based on the doctor's professional capabilities , values and ethics

c. Scientific: adopting a critical and research based approach to practice and maintaining this through continuing learning and quality improvement.

References

Council Directive 86/457/EEC of 15 September 1986 on specific training in general medical practice. 86/457/EEC. Official Journal L 267, 19/09/1986. p. 26. http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=CELEX:31986L0457:EN:HTML

Abbott, A. 1988, The system of professions. An essay on the division of labor. The University of Chicago Press. Chicago.

Albanese, M., Dottl, S., Mejicano, G., Zakowski, L., Seibert, C., Van Eyck, S., & Prucha, C. 2006, "Distorted Perceptions of Competence and Incompetence Are More Than Regression Effects", Advances in Health Sciences Education, vol. 11, no. 3, pp. 267-278.

Astin, J. A. 1998, "Why Patients Use Alternative Medicine: Results of a National Study", JAMA: The Journal of the American Medical Association, vol. 279, no. 19, pp. 1548-1553.

Baerheim, A. & Rortveit, G. 2002, "Defining general practice: an open process gives challenging postulates", Scandinavian Journal of Primary Health Care, vol. 20, no. 3, pp. 129-130.

Baker, M., Williams, J., & Petchey, R. 1995, "GPs in principle but not in practice: a study of vocationally trained doctors not currently working as principals", British Medical Journal, vol. 310, no. 6990, pp. 1301-1304.

Bandura 1994, "Self-efficacy," in Encyclopedia of human behavior, vol. 4 V.S. Ramachaudran, ed., Academic Press, New York, pp. 71-81.

Bandura, A. 1997, Self-Efficacy: The Exercise of Control, 1st edn, Freeman, New York.

Beaulieu, M. D., Dory, V., Pestiaux, D., Pouchain, D., Gay, B., Rocher, G., & Boucher, L. 2006, "General practice as seen through the eyes of general practice trainees: a qualitative study", Scandinavian Journal of Primary Health Care, vol. 24, no. 3, pp. 174-180.

Block, S. D., Clark-Chiarelli, N., Peters, A. S., & Singer, J. D. 1996, "Academia's chilly climate for primary care", JAMA: The Journal of the American Medical Association, vol. 276, no. 9, pp. 677-682.

Block, S. D., Clark-Chiarelli, N., & Singer, J. D. 1998, "Mixed messages about primary care in the culture of U.S. medical schools", Academic Medicine, vol. 73, no. 10, pp. 1087-1094.

Blok, G. A., Morton, J., Morley, M., Kerckhoffs, C. C., Kootstra, G., & van der Vleuten, C. P. 2004, "Requesting organ donation: the case of self-efficacy - Effects of the European Donor Hospital Education Programme (EDHEP)", Advances in Health Sciences Education., vol. 9, no. 4, pp. 261-282.

Blumenthal, D., Gokhale, M., Campbell, E. G., & Weissman, J. S. 2001, "Preparedness for clinical practice: reports of graduating residents at academic health centers", JAMA: The Journal of the American Medical Association, vol. 286, no. 9, pp. 1027-1034.

Bond, C. 2007, "The training of the "helpless" physician", Medscape General Medicince, vol. 9, no. 3, p. 47.

Borkan, J. 1999, "Immersion/crystallization," in Doing qualitative research, 2nd edition edn, B. F. Crabtree & W. L. Miller, eds., Sage Publications, Thousand Oaks, pp. 179-194.

Boud, D. & Falchikov, N. 1989, "Quantitative studies of student self-assessment in higher education: a critical analysis of findings.", Higher Education, vol. 18, pp. 529-549.

Bowler, I. & Jackson, N. 2002, "Experiences and career intentions of general practice registrars in Thames deaneries: postal survey", British Medical Journal, vol. 324, no. 7335, pp. 464-465.

Britt, H., Miller, G. C., Knox, S., Charles, J., Valenti, L., Henderson, J., Pan, Y., Bayram, C., & Harrison, C. 2002 General practice activity in Australia 2001-02. http://www.aihw.gov.au/publications/index.cfm/title/8149 .

Burton, R. F. 2002, "Misinformation, partial knowledge and guessing in true/false tests", Medical Education, vol. 36, no. 9, pp. 805-811.

Butler, D. L., Winne, P.H. 1995, "Feedback and Self-Regulated Learning: A Theoretical Synthesis", Review of Educational Research, vol. 65, no. 3, pp. 245-281.

Colthart, I., Bagnall, G., Evans, A., Allbutt, H., Haig, A., Illing, J., & McKinstry, B. 2008, "The effectiveness of self-assessment on the identification of learner needs, learner activity, and impact on clinical practice: BEME Guide no. 10", Medical Teacher, vol. 30, no. 2, pp. 124-145.

Colwill, J. M. 1992, "Where have all the primary care applicants gone?", The New England Journal of Medicine, vol. 326, no. 6, pp. 387-393.

Cruess, S. R., Johnston, S., & Cruess, R. L. 2004, ""Profession": A Working Definition for Medical Educators", Teaching & Learning in Medicine, vol. 16, no. 1, pp. 74-76.

Curry, L., Wergin, J. F., & and associates 1993, Educating professionals. Responding to new expectations for competence and accountability., 1st edition edn, Jossey-Bass Inc., San Francisco.

Davis, D. A., Mazmanian, P. E., Fordis, M., Van Harrison, R., Thorpe, K. E., & Perrier, L. 2006, "Accuracy of physician self-assessment compared with observed measures of competence: a systematic review", JAMA: The Journal of the American Medical Association, vol. 296, no. 9, pp. 1094-1102.

Degryse, J. 2003, De Eindproef Huisartsgeneeskunde. Doctoral dissertation. Katholieke Universiteit Leuven.

Dory, V., Beaulieu, M. D., Pestiaux, D., Pouchain, D., Gay, B., Rocher, G., & Boucher, L. 2009, "The development of self-efficacy beliefs during general practice vocational training: An exploratory study", Medical Teacher, vol. 31, no. 1, pp. 39-44.

Duffy, F. D., Lynn, L. A., Didura, H., Hess, B., Caverzagie, K., Grosso, L., Lipner, R. A., & Holmboe, E. S. 2008, "Self-assessment of practice performance: development of the ABIM Practice Improvement Module (PIM)", The Journal of Continuing Education in the Health Professions, vol. 28, no. 1, pp. 38-46.

Earle, L. & Kelly, L. 2005, "Coping strategies, depression, and anxiety among Ontario family medicine residents", Canadian Family Physician, vol. 51, pp. 242-243.

Eliason, B. C. & Schubot, D. B. 1995, "Personal values of exemplary family physicians: implications for professional satisfaction in family medicine", The Journal of Family Practice, vol. 41, no. 3, pp. 251-256.

Epstein, R. M., Siegel, D. J., & Silberman, J. 2008, "Self-monitoring in clinical practice: a challenge for medical educators", The Journal of Continuing Education in the Health Professions, vol. 28, no. 1, pp. 5-13.

Epstein, R. M. 1999, "Mindful Practice", JAMA: The Journal of the American Medical Association, vol. 282, no. 9, pp. 833-839.

Ericsson, K. A. 2004, "Deliberate practice and the acquisition and maintenance of expert performance in medicine and related domains", Academic Medicine, vol. 79, no. 10 Suppl, p. S1-S12.

European Academy of Teachers in General Practice (EURACT) 2005, The Euract Educational Agenda. Heyrman,J. ed. Leuven.

European Union of General Practitioners UEMO. 2003, “UEMO 2003 Declaration on Specific Training in General Practice/Family Medicine in Europe”. http://www.uemo.org.

Eva, K. W. & Regehr, G. 2005, "Self-assessment in the health professions: a reformulation and research agenda", Academic Medicine, vol. 80, no. 10 Suppl, p. S46-S54.

Eva, K. W. & Regehr, G. 2007, "Knowing when to look it up: a new conception of self-assessment ability", Academic Medicine, vol. 82, no. 10 Suppl, p. S81-S84.

Eva, K. W. & Regehr, G. 2008, ""I'll never play professional football" and other fallacies of self-assessment", The Journal of Continuing Education in the Health Professions, vol. 28, no. 1, pp. 14-19.

Feron, J. M., Cerexhe, F., Pestiaux, D., Roland, M., Giet, D., Montrieux, C., & Paulus, D. 2003, "GPs working in solo practice: obstacles and motivations for working in a group? A qualitative study", Family Practice, vol. 20, no. 2, pp. 167-172.

Fincher, R. M., Lewis, L. A., Jackson, T. W., & The Specialty Choice Study Group 1994, "Why students choose a primary care or nonprimary care career", The American Journal of Medicine, vol. 97, no. 5, pp. 410-417.

Forum des Associations de médecins Généralistes francophones. 2001, La fonction du médecin généraliste pour le troisième millénaire. Belgium.

Freidson, E. Professionalism: the third logic. On the practice of knowledge. 2001. The University of Chicago Press. Chicago.

Gay, B. What are the basic principles to define general practice? Presentation to the Inaugural Meeting of the European Society of General Practice/Family Medicine. 1995. Strasbourg.

Gordon, M. J. 1991, "A review of the validity and accuracy of self-assessments in health professions training", Academic Medicine, vol. 66, no. 12, pp. 762-769.

Grol, R., Wensing, M., Mainz, J., Jung, H. P., Ferreira, P., Hearnshaw, H., Hjortdahl, P., Olesen, F., Reis, S., Ribacke, M., & Szecsenyi, J. 2000, "Patients in Europe evaluate general practice care: an international comparison", British Journal of General Practice, vol. 50, no. 460, pp. 882-887.

Handfield-Jones, R. S., Mann, K. V., Challis, M. E., Hobma, S. O., Klass, D. J., McManus, I. C., Paget, N. S., Parboosingh, I. J., Wade, W. B., & Wilkinson, T. J. 2002, "Linking assessment to learning: a new route to quality assurance in medical practice", Medical Education, vol. 36, no. 10, pp. 949-958.

Harden, R. M., Sowden, S., & Dunn, W. R. 1984, "Some educational strategies in curriculum development: the SPICES model", ASME Medical Education Booklet N° 18, Medical Education, vol. 18, no. 4, pp. 284-297.

Harrell, P. L., Kearl, G. W., Reed, E. L., Grigsby, D. G., & Caudill, T. S. 1993, "Medical students' confidence and the characteristics of their clinical experiences in a primary care clerkship", Academic Medicine, vol. 68, no. 7, pp. 577-579.

Harrington, J. P., Murnaghan, J. J., & Regehr, G. 1997, "Applying a Relative Ranking Model to the Self-Assessment of Extended Performances", Advances in Health Sciences Education, vol. 2, no. 1, pp. 17-25.

Horrocks, S., Anderson, E., & Salisbury, C. 2002, "Systematic review of whether nurse practitioners working in primary care can provide equivalent care to doctors", British Medical Journal, vol. 324, no. 7341, pp. 819-823.

Huby, G., Gerry, M., McKinstry, B., Porter, M., Shaw, J., & Wrate, R. 2002, "Morale among general practitioners: qualitative study exploring relations

between partnership arrangements, personal style, and workload", British Medical Journal, vol. 325, no. 7356, pp. 140-142.

Hunt, D. P. 1982, "Effects of human self-assessment responding on learning.", The Journal of Applied Psychology, vol. 67, no. 1, pp. 75-82.

Institut Scientifique de Santé Publique 2001, Enquête de Santé par Interview Belgique 2001.

Iversen, L., Farmer, J. C., & Hannaford, P. C. 2002, "Workload pressures in rural general practice: a qualitative investigation", Scandinavian Journal of Primary Health Care, vol. 20, no. 3, pp. 139-144.

Jacques, A., Goulet, F., & Leboeuf, S. 2002, "Le maintien des compétences : un enjeu professionnel", Pédagogie Médicale, vol. 3, no. 2, pp. 116-121.

Jamtvedt, G., Young, J.M., Kristoffersen, D.T., O'Brien,M.A., Oxman, A.D. 2006, "Audit and feedback: effects on professional practice and health care outcomes.", Cochrane Database of Systematic Reviews no. 2. Art. No.: CD000259. DOI: 10.1002/14651858.CD000259.pub2.

Jordan, J., Brown, J. B., & Russell, G. 2003, "Choosing family medicine. What influences medical students?", Canadian Family Physician, vol. 49, pp. 1131-1137.

Katz, S., Feigenbaum, A., Pasternak, S., & Vinker, S. 2005, "An interactive course to enhance self-efficacy of family practitioners to treat obesity", BMC Medical Education, vol. 5, no. 4. doi:10.1186/1472-6920-5-4.

Kaufman, D. M. 2003, "ABC of learning and teaching in medicine: Applying educational theory in practice", British Medical Journal, vol. 326, no. 7382, pp. 213-216.

Khan, K. S., Davies, D. A., & Gupta, J. K. 2001, "Formative self-assessment using multiple true-false questions on the Internet: feedback according to

confidence about correct knowledge", Medical Teacher, vol. 23, no. 2, pp. 158-163.

Kmietowicz, Z. 2001, "Quarter of GPs want to quit, BMA survey shows", British Medical Journal, vol. 323, no. 7318, p. 887.

Knowles, M. 1973, The adult learner: a neglected species. Gulf Publishing, Houston.

Kramer, A. W., Zuithoff, P., Jansen, J. J., Tan, L. H., Grol, R. P., & van der Vleuten, C. P. 2007, "Growth of self-perceived clinical competence in postgraduate training for general practice and its relation to potentially influencing factors", Advances in Health Sciences Education, vol. 12, no. 2, pp. 135-145.

Krueger, R. A. Analyzing and reporting focus group results. 1998. SAGE Publications. Thousand Oaks.

Krueger, R. A. & Casey, M. A. Focus Groups. 3rd edition. 2000. SAGE Publications. Thousand Oaks.

Kutob, R. M., Senf, J. H., & Campos-Outcalt, D. 2003, "Declining interest in family medicine: perspectives of department heads and faculty", Family Medicine, vol. 35, no. 7, pp. 504-509.

Kuzel, A. J. 1999, "Sampling in qualitative inquiry.," in Doing qualitative research, B. F. Crabtree & W. L. Miller, eds., Sage Publications. Thousand Oaks, pp. 33-45.

Leclercq, D. 1993, "Validity, reliability, and acuity of self-assessment in educational testing," in Item banking: interactive testing and self-assessment, D. Leclercq & J. Bruno, eds., Springer Verlag, Berlin, pp. 114-131.

Levasseur, G. & Schweyer, F.-X. 2004. Profil et devenir des jeunes médecins généralistes en Bretagne. Les dossiers de l'URCAM Bretagne.

http://resmed.univ-rennes1.fr/mgrennes/IMG/pdf/Dossier_N_22_N_special_20.pdf

Lockyer, J. 2003, "Multisource feedback in the assessment of physician competencies", The Journal of Continuing Education in the Health Professions, vol. 23, no. 1, pp. 4-12.

Lublin, J. R. 1992, "Role modelling: a case study in general practice", Medical Education, vol. 26, no. 2, pp. 116-122.

MacKean, P. & Gutkin, C. 2003, "Fewer medical students selecting family medicine. Can family practice survive?", Canadian Family Physician, vol. 49, pp. 408-9.

Malterud, K. 2001, "Qualitative research: standards, challenges, and guidelines", Lancet, vol. 358, no. 9280, pp. 483-488.

Mann, K., Gordon, J., & MacLeod, A. 2007, "Reflection and reflective practice in health professions education: a systematic review", Advances in Health Sciences Education. doi. 10.1007/s10459-007-9090-2.

Marel, G. M., Lyon, P. M., Field, M.J., Barnsley, L., Hibbert, E., & Parise, A. 2000, "Clinical skills in early postgraduate medical trainees: patterns of acquisition of confidence and experience among junior doctors in a university teaching hospital", Medical Education, vol. 34, no. 12, pp. 1013-1015.

Martin, D., Regehr, G., Hodges, B., & McNaughton, N. 1998, "Using videotaped benchmarks to improve the self-assessment ability of family practice residents", Academic Medicine, vol. 73, no. 11, pp. 1201-1206.

Martini, C. J., Veloski, J. J., Barzansky, B., Xu, G., & Fields, S. K. 1994, "Medical school and student characteristics that influence choosing a generalist career", JAMA: The Journal of the American Medical Association, vol. 272, no. 9, pp. 661-668.

Mason, S. & Ellershaw, J. 2004, "Assessing undergraduate palliative care education: validity and reliability of two scales examining perceived efficacy and outcome expectancies in palliative care", Medical Education, vol. 38, no. 10, pp. 1103-1110.

Medical Professionalism Project 2002, “Medical professionalism in the new millenium: a physician charter”, Annals of Internal Medicine, vol. 136, no. 3, pp.243-246.

Miller, G. A. 1956, "The Magical Number Seven, Plus or Minus Two: Some Limits on our Capacity for Processing Information", Psychological Review, vol. 63, pp. 81-97.

Moore, G. & Showstack, J. 2003, "Primary care medicine in crisis: toward reconstruction and renewal", Annals of Internal Medicine, vol. 138, no. 3, pp. 244-247.

Muijtjens, A. M., Mameren, H. V., Hoogenboom, R. J., Evers, J. L., & van der Vleuten, C. P. 1999, "The effect of a 'don't know' option on test scores: number-right and formula scoring compared", Medical Education , vol. 33, no. 4, pp. 267-275.

Nelson, T. O. & Narens, L. 1994, "Why investigate metacognition?," in Metacognition: Knowing about Knowing, J. Metcalfe & A. P. Shimamura, eds., MIT Press, Cambridge, pp. 1-25.

Nomura, K., Yano, E., Aoki, M., Kawaminami, K., Endo, H., & Fukui, T. 2008, "Improvement of residents' clinical competency after the introduction of new postgraduate medical education program in Japan", Medical Teacher, vol. 30, no. 6, p. e161-e169.

Norman, G. R. 1999, "The adult learner: a mythical species", Academic Medicine, vol. 74, no. 8, pp. 886-889.

O'Brien, H. V., Marks, M. B., & Charlin, B. 2003, "Le feedback (ou rétro-action) : un élément essentiel de l'intervention pédagogique en milieu clinique", Pédagogie Médicale, vol. 4, no. 3, pp. 184-191.

Olesen, F., Dickinson, J., & Hjortdahl, P. 2000, "General practice - time for a new definition", British Medical Journal, vol. 320, no. 7231, pp. 354-357.

Oriel, K., Plane, M. B., & Mundt, M. 2004, "Family medicine residents and the impostor phenomenon", Family Medicine, vol. 36, no. 4, pp. 248-252.

Pestiaux, D. & Vanwelde, C. 2002, "Qu'en pense la dame de Saint-Léon? Les nouveaux habits de la médecine générale.", Louvain Médical, vol. 121, pp. S213-S219.

Pitkala, K. H. & Mantyranta, T. 2003, "Professional socialization revised: medical students' own conceptions related to adoption of the future physician's role - a qualitative study", Medical Teacher, vol. 25, no. 2, pp. 155-160.

Regehr, G. & Eva, K. 2006, "Self-assessment, self-direction, and the self-regulating professional", Clinical Orthopaedics and Related Research, vol. 449, pp. 34-38.

Regehr, G., Hodges, B., Tiberius, R., & Lofchy, J. 1996, "Measuring self-assessment skills: an innovative relative ranking model", Academic Medicine, vol. 71, no. 10 Suppl, p. S52-S54.

Reiter, H. I., Eva, K. W., Hatala, R. M., & Norman, G. R. 2002, "Self and peer assessment in tutorials: application of a relative-ranking model", Academic Medicine, vol. 77, no. 11, pp. 1134-1139.

Rosser, W. W. 2002a, "The decline of family medicine as a career choice", Canadian Medical Association Journal, vol. 166, no. 11, pp. 1419-1420.

Rowsell, R., Morgan, M., & Sarangi, J. 1995, "General practitioner registrars' views about a career in general practice", British Journal of General Practice, vol. 45, no. 400, pp. 601-604.

Safran, D. G. 2003, "Defining the future of primary care: what can we learn from patients?", Annals of Internal Medicine, vol. 138, no. 3, pp. 248-255.

Sargeant, J., Mann, K., van der Vleuten, C. & Metsemakers, J. 2008, ""Directed" self-assessment: practice and feedback within a social context", The Journal of Continuing Education in the Health Professions, vol. 28, no. 1, pp. 47-54.

Schafer, S., Shore, W., French, L., Tovar, J., Hughes, S., & Hearst, N. 2000, "Rejecting family practice: why medical students switch to other specialties", Family Medicine, vol. 32, no. 5, pp. 320-325.

Schers, H., van de Ven, C., van den Hoogen, H., Grol, R., & van den Bosch, W. 2004, "Family medicine trainees still value continuity of care", Family Medicine, vol. 36, no. 1, pp. 51-54.

Schön, D. A. 1987, Educating the reflective practitioner, 1st edn, Jossey-Bass, San Francisco.

Schön, D. A. 1996, The reflective practitioner: how professionals think in action. Arena. Aldershot.

Schweyer, F.-X. & Levasseur, G. 2003, Profil et devenir des jeunes médecins généralistes en Bretagne. Etat des connaissances à partir d'une étude documentaire et d'une revue de la littérature.

Showstack, J., Rothman, A. A., & Hassmiller, S. 2003, "Primary care at a crossroads", Annals of Internal Medicine, vol. 138, no. 3, pp. 242-243.

Silver, I., Campbell, C., Marlow, B., & Sargeant, J. 2008, "Self-assessment and continuing professional development: the Canadian perspective", The

Journal of Continuing Education in the Health Professions, vol. 28, no. 1, pp. 25-31.

Son, L. K. & Schwartz, B. L. 2002, "The relation between metacognitive monitoring and control," in Applied Metacognition, T. J. Perfect & B. L. Schwartz, eds., Cambridge University Press, Cambridge, pp. 15-38.

Sox, H. C. 2003, "The future of primary care", Annals of Internal Medicine, vol. 138, no. 3, pp. 230-231.

Stevens, R. A. 2001, "The Americanization of family medicine: contradictions, challenges, and change, 1969-2000", Family Medicine, vol. 33, no. 4, pp. 232-243.

Sullivan, P. 2002, ""This is brand new for us": FP residencies go begging as match ends", Canadian Medical Association Journal, vol. 166, no. 11, p. 1449.

Tousignant, M. & DesMarchais, J. E. 2002, "Accuracy of student self-assessment ability compared to their own performance in a problem-based learning medical program: a correlation study", Advances in Health Sciences Education, vol. 7, no. 1, pp. 19-27.

Van Baelen, S., Goedhuys, J., Heyrman, J., Stroobants, R., & Minguet, C. 2001, Het beroep van huisartsen die in 1995 afstudeerden anno 2000. Report.

van Leeuwen, Y. D., Mol, S. S., Pollemans, M. C., van der Vleuten, C. P., Grol, R., & Drop, M. J. 1997, "Selection for postgraduate training for general practice: the role of knowledge tests", British Journal of General Practice, vol. 47, no. 419, pp. 359-362.

Veloski, J., Boex, J. R., Grasberger, M. J., Evans, A., & Wolfson, D. B. 2006, "Systematic review of the literature on assessment, feedback and

physicians' clinical performance: BEME Guide No. 7", Medical Teacher, vol. 28, no. 2, pp. 117-128.

Violato, C. & Lockyer, J. 2006, "Self and peer assessment of pediatricians, psychiatrists and medicine specialists: implications for self-directed learning", Advances in Health Sciences Education, vol. 11, no. 3, pp. 235-244.

Ward, M., Gruppen, L., & Regehr, G. 2002, "Measuring self-assessment: current state of the art", Advances in Health Sciences Education, vol. 7, no. 1, pp. 63-80.

Ward, M., MacRae, H., Schlachta, C., Mamazza, J., Poulin, E., Reznick, R., & Regehr, G. 2003, "Resident self-assessment of operative performance", American Journal of Surgery, vol. 185, no. 6, pp. 521-524.

Whitcomb, M. E. & Cohen, J. J. 2004, "The future of primary care medicine", The New England Journal of Medicine, vol. 351, no. 7, pp. 710-712.

WHO regional office for Europe 1998, Framework for professional and administrative development of general practice/family medicine in Europe, World Health Organization Regional Office, Copenhagen.

Wiest, F. C., Ferris, T. G., Gokhale, M., Campbell, E. G., Weissman, J. S., & Blumenthal, D. 2002, "Preparedness of internal medicine and family practice residents for treating common conditions", JAMA: The Journal of the American Medical Association, vol. 288, no. 20, pp. 2609-2614.

WONCA Europe 2002, The European definition of general practice / family medicine. Geneva.

Wright, S., Wong, A., & Newill, C. 1997, "The impact of role models on medical students", Journal of General Internal Medicine, vol. 12, no. 1, pp. 53-56.

Young, G. P., Wagner, M. B., Kellermann, A. L., Ellis, J., & Bouley, D. 1996, "Ambulatory Visits to Hospital Emergency Departments: Patterns and Reasons for Use", JAMA: The Journal of the American Medical Association, vol. 276, no. 6, pp. 460-465.

List of publications

Dory V, Degryse J, Roex A, Vanpee D. “Usable knowledge, hazardous ignorance - beyond the percentage correct score”, Medical Teacher. In press.

Dory V, Gagnon R, de Foy T, Duyver C, Leconte S. “A novel assessment of an evidence-based practice course using an authentic assignment”, Medical Teacher. In press.

Roex A, Clarebout G, Dory V, Degryse J. 2009, “Can ill-structured problems reveal beliefs about medical knowledge and knowing? A focus-group approach”, BMC Medical Education,9:62. doi:10.1186/1472-6920-9-62.

Beaulieu MD, Dory V, Pestiaux D, Pouchain D, Rocher G, Rioux M, Gay B, Boucher L. 2009, “What does it mean to be a family physician? An exploratory study with family medicine residents from 3 countries”, Canadian Family Physician,55(8):e14-20.

Dory V, Gagnon R, Charlin B. 2009, “Is case-specificity content-specificity? An analysis of data from extended-matching questions”, Advances in Health Sciences Education. doi: 10.1007/s10459-009-9169-z.

Dory V, de Foy T, Degryse J. 2009, “L'auto-évaluation : postulat préalable, finalité de la mission éducative ou utopie pédagogique ? Clarifications conceptuelles et pistes pour une application en éducation médicale”, Pédagogie Médicale,10(1):41-53.

Dory V, Beaulieu MD, Pestiaux D, Pouchain D, Gay B, Rocher G, Boucher L. 2009, “The development of self-efficacy beliefs during general practice vocational training: an exploratory study”, Medical Teacher,31(1):39-44.

Dory V, Degryse J, C Minguet, G Beuken, D Pestiaux. 2008, “Le stage clinique de la maîtrise complémentaire en médecine générale à l’UCL et son impact sur l’acquisition de connaissances”, Louvain Médical;127(4):103-112.

Beaulieu MD, Dory V, Pestiaux D, Pouchain D, Gay B, Rocher G, Boucher L. 2006, “General practice as seen through the eyes of general practice trainees: a qualitative study”, Scandinavian Journal of Primary Health Care;24(3):174-80.