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Self-Ratings of Confidence in Clinical & Critical Thinking Problem-Solving as a Function of Post-Qualification Experience: A Study of Radiation Therapists

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Abstract

Recognising one's abilities and limits in clinical tasks is a valuable part of professionalism. This study investigated the self-ratings of problem-solving confidence of radiation therapists in two domains: clinical scenarios and critical thinking items. We divided the sixty participants into three groups based on post-qualification experience (PQE), and found that greater PQE was linked with higher self-rated confidence on clinical scenarios, but not in critical thinking items.

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Introduction

Awareness of one's own abilities and limitations in a clinical setting is an important part of professional practice and development. Assessment of one's own thinking and reasoning is part of metacognition, or the capacity to reflect on one's own thinking patterns (Schwartz & Perfect, 2002). It has been found that people overestimate how good they are on an assigned decisions or tasks in studies of everyday activities across education, health perception, and work (Dunning, Heath, & Suls, 2004; Lichtenstein, Fischhoff, & Phillips, 1982). Several studies have shown that doctors and other health professionals are often poor at rating their own level of knowledge performance. For example, Weiss et al. (2005) found that residents in obstetrics / gynaecology training were poor at judging their own technical skills and clinical problem-solving. The confidence ratings nurses gave in their knowledge of core life-support protocols did not correlate with their actual knowledge base (Marteau, Johnston, Wynne, & Evans, 1989). Clinical psychologists have been found to overestimate the likelihood that their assessments of documentation relating to clients will lead to accurate judgments (Oskamp, 1965). Within academia (Trafimow & Sniezek, 1994), politics (Tetlock, 2003), and medicine (Wallstein, 1981), it has been found that the self-rated confidence of both novices and experts does not predict good task performance. Clearly, the accuracy of health professionals' self-ratings on clinical decision-making is pertinent for both patient outcomes and good professional development.

In this study we examine the degree of accuracy in self-ratings of problem-solving in radiation therapists (RTs) at different levels of post-qualification experience (PQE): basic, senior and clinical specialist. RTs were chosen for two reasons: first, to redress the overrepresentation of medics in the clinical decision-making literature (cf. Chapman & Sonnenberg, 2000); and second, as the population of RTs in Ireland is approximately 160, we would be able to sample a high proportion of the total number of RTs, thus boosting generalisability of the findings.

We used two categories of problem – ambiguous clinical scenarios, where there is no unequivocally correct answer, and critical thinking items (CTIs). CTIs test the process of sifting through, synthesising and evaluating knowledge and data in order to reach a logically-derived decision (Cottrell, 2005). They are increasingly being used as a selection tool in professions, and are part of the BioMedical Admissions Test (BMAT) for entry to medicine, veterinary medicine, and some related courses in some UK institutions. The inclusion of CTIs allows us to check the accuracy of self-ratings outside of the clinical workplace and thus gives a fuller picture of the respondents' metacognition. In this paper, we explore whether self-ratings of task performance differ according to PQE and the type of problem encountered.

Method

Participants

Ethics approval for the study was granted by the research ethics committee of the Faculty of Health Sciences, Trinity College, Dublin. Sixty radiation therapists working at various hospitals in the Republic of Ireland volunteered for the study. In terms of PQE, participants classified themselves as follows (mean number of months of experience in parentheses): 29 Radiation Therapists (RTs) (21 months); 17 Senior Radiation Therapists (SRTs) (70 months); 14 Clinical Specialists (CSs) (134 months).

Materials

Based on the results of a pilot study of academic RTs, we devised three written clinical scenarios each varying in difficulty (see Appendix A). These were reviewed by two academic RTs. The CTIs were randomly selected from the BMAT (see Appendix B). All six items were presented as a questionnaire which was distributed as an e-mail attachment, with the clinical scenarios preceding the CTIs.

Procedure

Participants were informed that they could generate as many clinical scenario solutions as they saw fit. Because the solutions generated were self-evident, there was no need for an inter-rater reliability coefficient calculation. For the purpose of face validity of the study, participants were told about the scoring systems for the clinical scenarios and the CTIs; however, as self-ratings of task performance were the focus of the study, these data were not scored. Participants were instructed to generate as many solutions to the clinical

scenarios as they saw fit, and to answer the CTIs. Participants then rated their confidence on all clinical scenarios and on all CTIs by circling one number from 1 (not very confident) to 10 (very confident) on a Likert scale.

Design

Participants were assigned to one of three groups dependent upon level of PQE: RTs (n = 29), SRTs (n = 17), and CSs (n = 14). We used a 2 (problem type) x 3 (PQE) mixed design analysis of variance (ANOVA) with problem type as a repeated measure.

Results

Means (and standard deviations) of confidence ratings per problem type and PQE level are presented in Table 1.

Insert Table 1 about here

A 2 (problem type) x 3 (PQE level) mixed ANOVA produced a main effect of problem type, $F(1, 57) = 50.62$, $MSE = .45$, $p < .001$, $\eta^2 = .47$, with participants being more confident overall on the clinical scenarios. There was also a main effect of PQE level, $F(2, 57) = 4.07$, $MSE = 2.11$, $p < .001$, $\eta^2 = .13$, which revealed that, regardless of

problem type, ratings were highest among SRTs and lowest among RTs. There was also an interaction, $F(2,57) = 33.55$, MSE $= .45$, $p < .001$, $\eta^2 = .54$, which we further investigated: a one-factor ANOVA on the clinical scenarios produced a main effect, $F(2,57) = 17.72$, MSE $= 1.15$, $p < .001$, $\eta^2 = .38$, with RTs being less confident than SRTs who were less confident than CSs (ps $< .05$); a one-factor ANOVA on the CTIs produced no significant main effect, $F(2,57) = 2.32$, MSE $= 1.41$, $p > .10$, $\eta^2 = .08$, with no reliable difference among the PQE groups.

Discussion

For the clinical scenarios, the results revealed that self-rated confidence increased in line with PQE. This is a logical result, as we would expect that the greater store of successful decisions in the careers of more experienced RTs would serve as a benchmark in the self-rating task. Indeed, one could argue that it is helpful for basic grades to be less confident – this makes them more likely to ask for help and so not make hasty or poor quality decisions.

For the critical thinking problems, the results revealed that self-rated confidence did not differ according to PQE. This finding suggests that the greater self-confidence of more experienced staff is domain-specific, and does not necessarily translate to other problem-solving scenarios. Furthermore, less experienced staff are more likely to be recent graduates, and so would perhaps be more confident at abstract problem-solving as a function of their more recent exposure to academic course content.

The limitations of our study include the fact that we did not calibrate task performance; one possible methodological difficulty here is that an assessment of actual task performance would require an agreed measure. Drawing up such a measure was outside the expertise of the authors of this paper. If an agreed measure with good metric properties were devised, then future work could examine the correlation between self-confidence ratings and task performance.

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Appendix A: Clinical Scenarios

For the each of following scenarios, a more senior member of staff is unavailable for consultation, so you have to make the decision yourself. Remember that there is no correct or incorrect answer. Please write as little or a much as you wish for each scenario.

Scenario 1

The treatment machine is just back in service after a breakdown period of two hours. One of the patients receiving treatment for prostate cancer is demanding that he is treated next as he is afraid that he will not be able to wait longer with a full bladder. However, there are two other patients ahead of him in the queue. Additionally, he is already late for another appointment in a different hospital. What do you decide to do?

Scenario 2

You and one other radiation therapist are covering for staff breaks on a particular unit. A patient who is in his second week of treatment for a head and neck malignancy arrives for his treatment. However, when you set him up in the BDS you notice that the shielding in the form of customised lead is inaccurate in the left-right axis. All port films and diode measurements have been acceptable to date. What do you decide to do?

Scenario 3

A patient who is being treated for breast cancer comes for treatment at 10 pm on a Thursday. She is to receive the penultimate fraction of her radiotherapy course. Since the

team last saw her, her skin reaction has progressed to a grade four (EORTC/RTOG) in the infra-mammary fold. She is really looking forward to finishing her treatment on Friday and returning to her family home on Saturday to attend her son's wedding. What do you decide to do?

Appendix B: Critical Thinking Items

Problem 1

Finally, it was time to snack on a sandwich. The maths teacher removed her sandwich and remarked that the coating of mould had now completely covered the surface of the bread. It was June 30th. The sandwich was first packed for a field trip on June 1st. If the area occupied by the mould doubled every day, on what day was the surface half covered with mould?

Problem 2

Every branchiopod is a crustacean and every crustacean is an arthropod. No insect is a crustacean. Which two of the following are true?

    a) Every branchiopod is an arthropod

    b) No insect is an arthropod

    c) No branchiopod is an insect

    d) Some crustaceans are insects

Problem 3

In a class of 30 students, all must study at least one language, but no more than three languages. 70 % study French, 40 % study German, 20 % study Spanish and 10 % study Italian. Which two of the following must be true?

    a) At least 3 study both French and German

    b) No more then 12 study French and German

    c) At least 9 do not study either French or German

Table 1

Mean (and standard deviation) confidence ratings per level of PQE and problem type

Problem Type	PQE Level		
	RT (n = 29)	SRT (n = 17)	CS (n = 14)
Clinical Scenario	7.48 (1.30)	8.76 (.90)	9.43 (.65)
CTI	7.72 (1.28)	8.06 (1.03)	7.14 (1.17)