

Quality Assurance of the Applied Knowledge Test (AKT) of the MRCGP examination. An immediate post-test questionnaire evaluation of the candidates' views.

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Status box

WHAT IS ALREADY KNOWN IN THIS AREA?

The AKT is a high-stakes computer-based test for licensing UK general practitioners (GPs) and forms part of the Membership of the Royal College of General Practitioners examination

The AKT uses different question formats and consistently demonstrates high reliability

Pre-trialling of new questions has been shown to be unnecessary due to a systematic process of test construction

WHAT THIS WORK ADDS

There was a high response rate from candidates asked their views immediately after its completion.

A computer based evaluation questionnaire immediately after each test enables candidates' views to be easily measured over time.

Feedback from candidates completing the test suggested the assessment was valid and highlighted areas for improvement.

Candidates identified training and knowledge needs particularly around research and practice administration

We are not aware of any similar evaluation of a high-stakes postgraduate licensing examination

SUGGESTIONS FOR FURTHER RESEARCH

The relationship between changes in the AKT and candidates' views of the assessment.

Comparison of AKT performance in candidates who have had different experiences of general practice prior to or during specialty training.

Abstract

The Applied Knowledge Test (AKT) of the MRCGP examination is a computer-based assessment delivered three times a year. A computerised questionnaire, administered immediately after the test, sought candidates' views as part of the test evaluation.

Of 1681 candidates taking the test 1418 (84%) responded. Most candidates believed that the test assessed their knowledge of problems relevant to general practice. Their feedback highlighted areas where improvements could be made.

Candidates' views of postgraduate specialty medical examinations in the UK are rarely sought or published. We are not aware of other published evidence.

The use of computer based testing enables immediate candidate feedback and can be used routinely to evaluate the test validity and formats.

The views of candidates are an important component of quality assurance in reviewing the content, format and educational experience of a high stakes examination.

Introduction

In October 2007 The Royal College of General Practitioners (RCGP) introduced both a new process and method for assessing applied knowledge as one of the components of a licensing examination for general practice.

The Applied Knowledge Test (AKT) is a 200 item computer-delivered multiple choice test, offered three times a year forming part of the Membership of the Royal College of General Practitioners (MRCGP) examination, which licenses doctors for UK general practice¹. The other exam components are a Clinical Skills Assessment (CSA) and a Workplace Based Assessment (WBA) which together assess the curriculum for general practice specialty training².

The AKT seeks to assess candidates' knowledge of common important areas of general practice, including general medicine, medical specialties, practice administration, epidemiology, research methods and statistics.

The AKT uses different question formats to test the breadth and depth of candidates' knowledge including the single best answer format, extended matching items, images and, more recently, free text responses and "drag and drop" items, where candidates have to complete an algorithm or table by placing tokens.

Test items are written by ten examiners all working in clinical general practice in the UK. Items are based on the RCGP curriculum blueprint,² referenced to current evidence, peer reviewed and critically appraised before they are added to the question bank. There is a standardised process for question selection and test construction and standard setting follows a modified Angoff process³.

Pre-trialling of new questions has been shown to be unnecessary due to a systematic process of question and test construction and evaluation which quality assures that the AKT tests current knowledge and guidelines³.

The AKT is delivered in 150 (Pearson VUE) test centres around the UK. The test is available three times a year for general practitioner registrars undertaking training programs in general practice. There are two sessions on each test date, morning and afternoon, with all candidates sitting the same test form. Test centres are invigilated with quarantining of morning and afternoon candidates to prevent communication between them. Appropriate adjustments for candidates with disabilities are provided to ensure that current statutory regulations are met.

While an evaluation of the first AKT (AKT 1) was undertaken in 2007, this was paper-based and only included a small sample of candidates (unpublished data). We conducted a survey of candidates immediately following the examination to assess candidates' views of the test content and formats being used. Our aim was to provide evidence from candidates as to the validity of the test overall, rather than the validity of individual questions which is undertaken as part of the post test evaluation of each AKT ⁴.

Method

In October 2012, at the end of AKT 16, all candidates were asked to complete a short questionnaire to seek their views on the content of the test. The questionnaire was developed and agreed by the AKT core group members to provide both quantitative and qualitative data information to evaluate candidates' views of the AKT. Assurances were given that no individual would be identified in the findings of the study. It was estimated that the questionnaire would take no longer than 10 minutes to complete. As part of a survey evaluation, candidates were asked to amplify their responses to four questions with free text comments:

- which questions they felt were less relevant to general practice.
- why they sat the AKT at that point in their training.
- if not English, what was their preferred language.
- to give any other comments on the AKT.

Analysis

The data were downloaded onto a Microsoft excel spreadsheet enabling analysis of the frequency of responses to each question and the extraction of free text responses for analysis.

Free text responses to each of the sections were organised using NVivo 7 to facilitate inductive thematic analysis ^{5,6}. Responses to free text questions were coded. Codes were then refined by checking the content of each for consistency and grouping data into appropriate themes, which in turn were grouped into categories of related themes. Theoretical saturation was reached before all responses were coded. Numerical analysis of themes and codes was used to determine the prevalence of opinions expressed by candidates ⁷.

Results

Of 1681 candidates completing AKT 16, all of whom had the opportunity to respond to the questionnaire, 1418 (84%) completed the questionnaire.

Content of the AKT

Most difficult and easiest topic areas

From a list of 13 options (Tables 1 and 2), respondents were asked to identify the three topic areas which they found most difficult and the three areas which they found the easiest. Research and statistics, administration and management, and therapeutics were identified by 1006 (71%), 872 (61%) and 475 (33%) respondents respectively as being the most difficult, whereas general medicine, women's health and surgery were identified as being the easiest by 680 (48%), 487 (34%) and 477 (34%) respectively.

Table 1

Table 2

Reasons for questions were found to be difficult

Respondents were asked to select up to three reasons from a list of seven, about why they had found questions difficult (Table 3). 1027 (72%) recognised that they had identified gaps in their knowledge and 623 (44%) selected time-consuming questions as one of the three reasons. 499 (35%) believed that topics did not appear relevant to general practice and 438 (31%) were not aware that they should know about a topic. Only 169 (12%) and 34 (2%) respectively found the free text format and drag and drop questions more difficult.

Table 3

Relevance of AKT

Relevance of the AKT in assessing the application of knowledge in general practice.

From a menu (Table 4), respondents were asked to identify up to three statements that best reflected their views of the relevance of the AKT in assessing their application of knowledge in general practice.

Of the ten choices, 836 (59%) respondents selected the statement that the test assessed their knowledge of problems relevant to general practice, 664 (47%) that the test assessed the range of their knowledge and 458 (32%) that the test was appropriate for GP in training. 481 (34%) believed the test assessed their knowledge of important problems, and 561 (40%) that the test assessed the application of their knowledge. However 171 (12%) respondents believed the questions were ambiguous and unclear and 91 (6%) that the questions were not appropriate for GP trainees at the end of training.

Table 4

Questions believed to be less relevant

Respondents were asked to identify any questions they felt were less relevant to the work of a GP, to give examples, and to state why. From a total of 496 written responses three areas of questioning emerged as being seen as less relevant to the work of a GP:

- statistics and research methods,
- overly specialised clinical or managerial knowledge
- questions which did not reflect everyday clinical practice, for example, not having access to resources such as a BNF.

Statistics and research methods

Statistics and research methods were identified as less relevant to general practice by 284 respondents. Many recognised that they needed to be able to interpret statistics and study designs but being able to calculate statistics using mental arithmetic under exam conditions was considered unnecessary as exemplified by the quote below:

"I understand that as GPs/doctors we need to have a good understanding of statistics but I feel some of the analysing required in the exam was in much more depth than is necessary in my day-to-day work as a GP"

While a basic understanding was viewed as relevant in order to interpret journal papers was, questions on definitions for terms such as "fluctuant error" and "ethnography", were considered too obscure and detailed. It was highlighted that statistical terminology could be looked up when reading papers. Moreover, candidates felt that it was unrealistic to expect them to calculate statistics without the aid of a calculator, for example one candidate asked:

"Working out statistics and mental arithmetic without a calculator – Why would I ever need to do this?"

Finally, some also highlighted that trainees received little teaching support for the research aspects of the curriculum and were unsure where to look for learning resources in this field.

"my trainers and senior colleague in the practice know very little about Evidence based medicine and to have 10% of the exam based on EBM felt very unfair today."

"statistics, completely irrelevant , I have not seen a single trainer or GP practice since qualifying who can critically appraise a paper or had a tutorial on stats"

Overly specialist clinical or managerial knowledge

114 respondents believed that questions were less relevant to general practice because they were testing knowledge which was more specialist or for which a referral would be made. These included second and third stage treatments which

would be initiated in secondary care and alternatives to lithium. For example one candidate commented:

"I think some of the questions asked in this exam are more relevant to specialty exams rather than an exam for a generalist. e.g. patient with eye pain"

Other areas that were considered less relevant were those which the candidates expected to be carried out by other health professionals such as diabetic neuropathy assessment which was usually conducted by practice nurses. This overlapped with the perception of statistics as less relevant to GPs because, as the quote below illustrates, this was considered the specialty of public health doctors:

"Public health/stats questions – e.g. question about which vaccination should be given to a country based on age - this is public health medicine not really GP"

Certain topics were considered inappropriate for trainee GPs to know about. 32 respondents commented that management/ administration and health and safety questions were less relevant during GP training and more relevant to GP partners and practice managers.

"Too much focus on statistics Health & safety regulations which we do not cover in training!"

Some stated that they were training to be salaried GPs and so would not need this knowledge. Finally, some believed that it was simply difficult to gain this kind of knowledge and administration or health and safety regulations had not been included in their training.

"I think that there needs to be more guidance for trainees regarding what sort of knowledge they need for IMT/ADMIN and the statistics part of the exam."

"In terms of study interpretation/design, [this is] not something which is taught in teaching sessions. General GP admin stuff is not well taught either including ethics."

Did not reflect everyday clinical practice

36 respondents believed that some questions did not reflect their experience of everyday clinical practice, and bore "little relation to their day-job". Candidates felt that the AKT focused on obscure elements of the job rather than the "core", "bread and butter" for general practice. For example respondents commented that they would rarely use fluorescein during eye tests, or interpret hearing tests and blood films. In addition, some conditions they were asked about, such as Addison's disease, were rare in clinical practice.

Others highlighted that in day-to-day clinical practice they would also have access to a British National Formulary (BNF) for drug side effects, lists of normal values for blood results, and immunisation schedules. For example, one person commented:

"there was a lot on interpretation of blood results without giving us the normal values. This is not a reflection of everyday practice."

However, 27 respondents expressed the opinion, with some provisos, that the questions were, on the whole, relevant to general practice.

“In my opinion each question was relevant to general practice but should we be given more time?”

“I do not think there was any question which was not relevant to GP practice.”

“The questions were generally fair, and I feel I was tested on a broad range of topics.”

Candidates not answering all the questions

1284 respondents (91%) had answered all 200 questions in the test. The 134 who not done so were asked to give up to three reasons why they had not answered all the questions and the number of responses are shown in Table 5. Questions taking too long to read were the most frequently identified reason, with a smaller number concerned about the complexity of questions or having to change answers. Only seven stated they had found the computer format difficult to use.

Table 5

Preparation for the AKT

The questionnaire also sought to identify how candidates had prepared for the AKT and were asked to identify the three most useful resources (Table 6). While 86% identified commercial revision material as the most useful resource (e.g. onexamination, Pastest), only 11% selected commercial MRCGP revision courses. However 35% saw the MRCGP exam section of the RCGP website as a useful source. The RCGP MRCGP revision courses were identified by only 7% of candidates as used in preparation. The educational supervisor was viewed as a revision resource by 22% candidates, the RCGP curriculum by 26% and other specialty trainees by 24%.

Table 6

General practice experience as part of a Foundation programme

Those respondents who were on a GP Specialty training programme, were asked how many months, if any, they had spent in general practice posts in a Foundation programme (Table 7). Approximately equal numbers had either no experience of general practice prior to specialty training, 572 (40%), or 4 months in general practice, 575 (41%). 85 had 3 months experience or less and 117 (8%) had six months experience in general practice.

Table 7

Duration of GP specialty training at time of sitting the AKT

Candidates were also asked to identify how long they had spent in general practice as part of specialty training at the time they took the AKT (Table 8). Most respondents had spent between 6 and 12 months in specialty training and fewer between 0 and 5 months. Only 131 had spent between 13 and 18 months but 71 had spent over 18 months in specialty training.

Table 8

Analysis of the results since the inception of the AKT had shown variable pass rates depending on the stage of training when the exam was taken. As a result of this, candidates who started training from August 2010 onwards were restricted to taking the AKT in their second (ST2) or third (ST3) training year rather than being able to take it at any time in their training. Those candidates sitting the AKT for the first time were asked to give reasons as to why they sat the AKT at this point in their training. While 878 candidates responded to this question 27 respondents commented that this was their second or subsequent attempt. The written responses highlighted three motivating factors:

- feeling prepared;
- the need to take the exam for continued career progression
- personal factors

Feeling prepared

Feeling prepared or that they had had time to revise for the exam were important factors highlighted by 216 of the 878 respondents. This theme contained three different aspects.

Firstly respondents suggested that they had chosen to undertake the AKT exam at that time because they had been working in a job which had left them sufficient time to revise, by allowing study leave and having reduced on-call commitments. This was contrasted to the experience or anticipated demands of posts such as accident and emergency where they felt they would not have been able to prepare:

“On practical level, easier to revise whilst in ST3GP placement - given time for independent study as well as being able to take additional study leave. More relevant revising when actually doing the job.”

“Waited until ST3 as the on call rotas for ST2 jobs were too demanding to fit in revision”

Secondly 117 chose to sit the exam because they were working in general practice at that time and considered the exam a good motivator to improve their knowledge for clinical practice. Several commented that they expected their daily experience of general practice cases to help their revision and others that they wanted to use the exam as a way of assessing their own knowledge and educational progress.

Thirdly, having experience in general practice emerged as a theme across 182 of responses choosing to sit the AKT in their third year when they expected to be more experienced. 76 respondents stated that they had simply chosen that sitting as it was the “first opportunity” to “get it out of the way”. 57 others commented that they had wanted to take the exam early enough in their training to leave time to retake it if necessary.

Timing the AKT in relation to the Clinical Skills Assessment (CSA) was also an important theme to emerge from 149 respondents. Some wanted to take the AKT early in order to leave time free afterwards to study for the CSA, while others wanted to take the CSA soon after the AKT in order to combine their study for the two exams:

“I’m an ST3 currently, and I wanted to get this out of the way to leave the rest of the academic year for honing in on my clinical practice and getting ready for CSA.”

“I did not want to sit it too early as was advised would require the knowledge gained for CSA”

For 47 respondents the choice of when to take the AKT in the three year specialty training period was influenced by advice from trainers, “the deanery”, colleagues and a desire to keep pace with peers. Some had been advised to take the AKT at the beginning of their third year after they had had experience of general practice. Others had to do the exam at that time because they were very near the end of their specialty training.

Personal factors

109 respondents cited personal reasons for the timing of their exam. For 39 the timing of their exam had been influenced by childbirth or maternity leave. Other reasons included marriages, deaths, and health problems. Nine candidates cited the cost of the exam stating that it was too expensive to risk failing and needing to pay off their student loan before they could afford the exam fees.

Equality and diversity

As part of monitoring equality and diversity in the MRCGP, candidates were asked if English was their preferred language for reading and writing, and if not, candidates were asked to specify their preferred language.

Candidates whose preferred language for reading and writing was not English could take longer to read the questions and potentially be disadvantaged. However only 34 respondents stated that their preferred language for reading and writing was not English. 11 of these stated that English was their preferred language for reading and writing even though it was not their native language. In total, 26 languages were identified with the most common being Farsi, Tamil and Urdu.

Further comments about the AKT

379 candidates responded to this request and most fell into one of 4 themes:

- preparatory support

- comfort and the organisational delivery
- exam content
- a fair test of applied knowledge.

Preparatory support

50 respondents did not feel they had received enough good quality advice and support in preparing for the AKT exam and were not sure where to look to find revision resources. Several believed the questions provided on the RCGP website were unrepresentative of those in the exam or of limited use because no answers were provided. Respondents also felt that commercial revision material did not reflect the exam very closely and some believed that revision resources needed to be more widely advertised:

"I'm not sure if we were advised incorrectly by PDs (Program Directors)/supervisors regarding the structure of our revision or whether this exam was very different in content to previous exams. However, there did seem to be a significant difference between the type of questions in the practice AKT exam on the RCGP website and the exam I have just taken today."

"Overall fair test, I would like to add that most useful revision resources for myself have been the Oxford Handbook of General practice, BNF (particularly the mobile edition that NICE now publish for free - please can you advertise it a bit more really useful for day to day practice as well!) and using the RCGP curriculum self assessment form to identify gaps in my knowledge and read around the subject."

Having time to revise around on call rotas, needing study leave, and the possibility of the exam being available at more times were also raised again.

Comfort and organisational delivery of the exam

39 respondents complained about the examination setting and organisation. These included lack of breaks and rules against taking water and food into the exam room, venues being over heated and noisy, and inadequate parking. The lack of an indication of progress through the test, for example by means of a clock were also highlighted as concerns.

12 respondents complained of eye strain from staring at a computer for more than three hours and said that it was difficult to concentrate for that long.

"Difficult to read a computer screen for 3 hours and concentrate - surely this can't be in line with health and safety recommendations?"

It was also suggested that giving more time may help candidates from overseas to complete the exam:

"Perhaps taking into account that some candidates are from overseas and English is not the first language, so it takes longer to read long questions and time wise feeling under pressure."

Content of the exam

Candidates reiterated concerns about the relevance and appropriateness of exam content for GPs in training. 15 respondents commented on the difficulty of combining breadth of the GP curriculum, the level of detail needed, and the pressure of time within the exam itself:

“I found this exam very challenging and think it is a difficult exam to revise for as the curriculum is so broad, it is difficult to pass due to the complexity of the questions and the time constraints”.

A further 17 simply stated that they felt it was a difficult or “tricky” exam and reiterated concerns about not knowing what to revise for an exam that covers such a broad range of knowledge.

A fair test of applied knowledge

Finally 48 respondents believed that the AKT was a fair and appropriate test as illustrated below:

“Generally very appropriate questions and knowledge expected.”

Candidates commented that questions were based on the right level of knowledge for a GP trainee, that it was a fair and well organised exam and that they appreciated the exam as “a good motivational force for GP trainees... to acquire the relevant knowledge”. The test was viewed as a “good challenge” and two candidates even commented that they had enjoyed the examination. However, even these very positive comments were combined with concerns about the wordiness of questions and the amount of statistics in the paper.

Discussion

Main findings

Most respondents believed that the test assessed their knowledge of problems relevant to general practice. Detailed feedback highlighted areas where improvements could be made such as the type of statistical knowledge or administration being tested, the availability of calculators and the duration of the examination.

Candidates found research and statistics questions difficult, suggesting that these are areas of the curriculum about which registrars feel less confident. The lack of confidence of GP trainers in teaching evidence based medicine has been highlighted previously and further research into how the teaching of evidence based medicine may be improved was recommended⁸. While candidates believe these are difficult questions, the mean score for these was as high as that of the clinical medicine items, and psychometrically, these items performed reliably as a subset (20 items) of the AKT.

Candidate feedback identified areas of educational need (e.g. administration and management) and where more support was required to help GP registrars develop their knowledge and skills during training. The newer question formats of drag and drop and free tokens were found to be acceptable to the vast majority of candidates and as these also perform well supported their continued use.

Comparison with existing literature

A review of medical postgraduate certification, with the exception of the general practice, noted a complete lack of published original studies on UK assessment processes⁹. The evaluation over several assessments was seen as the missing link influencing the quality and the development of an effective assessment¹⁰.

Studies of feedback from the earlier MRCGP multiple choice paper (MCP) included candidates' views of the examination content^{11,12}, and the perceptions and performance of general practice trainers¹³. The AKT, in its new mode of delivery and as a licensing assessment, was piloted with volunteer practising GPs from the panel of MRCGP examiners, confirming the acceptability, feasibility and criterion validity of the AKT¹⁴.

The advantages and disadvantages of computer based testing have been well described¹⁵. In the context of a licensing examination, computer based tests enable large numbers of candidates to be examined across the breadth of general practice and provide an opportunity for feedback from candidates immediately after sitting the test.

Strengths and weaknesses

The high response rate supports the validity of the findings. We are not aware of other UK or internationally published findings of immediate feedback from a postgraduate high stakes medical examination. This process enabled candidates to provide their views when the memory of the test was recent. However, this also limits the opportunity for candidates to reflect on the assessment processes and given the stress of having just sat the test, may have affected candidates' responses.

Whilst some candidates, for example those with dyslexia, may be more likely to decline to give written feedback at the end of the test, this method of feedback was chosen to gain immediate insight into candidates' views across multiple test centres in a cost-effective way.

While the evaluation method was the same as used in the test it was judged to be the most pragmatic process. Although we acknowledge that this format may not have been suitable for all candidates, future evaluations could be designed to take account of this.

Implications for test conduct, policy and future research

Evidence from test evaluation can contribute to overall reviews of the examination process. A recent extensive review of the MRCGP¹⁶ including views from this questionnaire, have led to changes in the AKT being implemented, namely ten minutes extra time and an on-screen calculator (an on-screen clock and question indicator have always been available – see Comfort and organisational delivery of the exam). The effects of these changes continue to be evaluated.

There are also opportunities to assess the performance of candidates in relation to the duration of their general practice experience before first sitting the AKT.

There has been a review of the research and administrative items with a focus on the application of principles within the clinical context, such as interpreting results from drug advertisements, and using audit data to prioritise services. The development of

the AKT Content Guide¹⁷ was in response to the previous questionnaire, and provides a detailed list of topics that may appear in the exam. Constructive feedback for candidates is provided after each test on the exam website enabling ongoing participation in learning, improvement and reflection.

The findings also suggest that Deaneries should review educational provision in relation to administration, management, research and statistics.

The criteria for good assessment include candidates as important stakeholders in quality assurance in aligning assessment with educational practice¹⁸. Using the findings of the questionnaire to implement changes fulfils this requirement.

Conclusion

Feedback from candidates is a valuable component of quality assurance, providing information to those responsible for test design, and contributing to the governance of high stakes examinations.

We found that a computer delivered questionnaire administered after the test can generate a high response rate and provide opportunities for test evaluation.

Findings can also contribute to changes in test delivery: feedback from this survey led to introduction of calculators and increase in the time for candidates to undertake the test.

A computed based survey enabled immediate feedback following the AKT and demonstration of rigour in the assessment process. This approach provides additional opportunities to evaluate the content and format of the test.

Candidate feedback provides an opportunity to incorporate the findings from user views into improving high stakes examinations.

Funding

No funding was required for this evaluation

Ethical Approval

The authors confirm that this study was approved with candidates' consent as part of the ongoing quality assurance of the AKT and therefore did not require separate ethical approval.

Conflicts of interest

All except one author were members of the Applied Knowledge Test Group at the time of completion of the questionnaire. The other author is an independent researcher and has no involvement in the construction of AKT questions or the post test analysis. There are no other competing interests.

References

1. Royal College of General Practitioners (2012) MRCGP exam overview. RCGP. <http://www.rcgp.org.uk/training-exams/mrcgp-exams-overview.aspx> (accessed 08.11.14).
2. Royal College of General Practitioners. (2012) GP curriculum: overview. RCGP <http://www.rcgp.org.uk/gp-training-and-exams/gp-curriculum-overview.aspx> (accessed 08.11.14).
- 3 Dixon H, Blow C, Milne P, Siriwardena A, (2014) Reliability of non-prettested versus prettested questions in the applied knowledge test (AKT) of the MRCGP: evidence of quality assurance. *Education for Primary Care: 25*, (3):149-154
4. Schuwirth L, Van Der Vleuten C (2011) General overview of the theories used in assessment: AMEE Guide No. 57 *Medical Teacher* 33: 783–797
- 5 Braun V, Clarke V. Using thematic analysis in psychology. *Qualitative Research in Psychology* 2006;3(2):77-101
- 6 Boyatzis RE. *Transforming qualitative information: thematic analysis and code development*. London: Sage, 1998.
- 7 Joffe H, Yardley L. Content and Thematic Analysis. In: Marks DF, Yardley L, editors. *Research Methods for Clinical and Health Psychology*. London: Sage, 2004
- 8 Siriwardena AN, Sandars J, Scott K (2004) Attitudes of general practice trainers to teaching evidence-based medicine *Education for Primary Care* 15: 611–17
- 9 Hutchinson L, Aitken P, Hayes T. (2002) Are medical postgraduate certification processes valid? A systematic review of the published evidence. *Medical Education:36*: 73-91.
- 10 Fowell SL, Southgate LJ, Bligh JG. (1999) Evaluating assessment: the missing link? *Medical Education:33*: 276-281.
- 11 Dixon H. (2003) Candidates' views of the MRCGP examination and its effects upon approaches to learning: a questionnaire study in the Northern Deanery. *Education for Primary Care:14*: 146-157.
- 12 Dixon H. (2005) The multiple-choice paper of the MRCGP examination: a study of candidates' views of its content and effect on learning. *Education for Primary Care:16*: 655-662
- 13 Dixon H, Blow C, Irish B, Milne P, Siriwardena AN. (2007) Evaluation of a postgraduate examination for primary care: perceptions and performance of general practitioner trainers in the multiple choice paper of the Membership Examination of the Royal College of General Practitioners. *Education for Primary Care:18*: 165-172.

- 14 Siriwardena AN, Dixon H, Blow C, Irish B, Milne P. (2009) Performance and views of examiners in the Applied Knowledge Test for the nMRCGP licensing examination. *British Journal of General Practice*:59: 38-43.
- 15 Cantillon P, Irish B, Sales D. (2004) Using computers for assessment in medicine. *British Medical Journal*:329: 606-609.
- 16 Foundation for Advancement of Medical Evaluation and Research (Faimer 2013) Independent Review of the Membership Examination of the Royal College of General Practitioners (unpublished)
- 17 Royal College of General Practitioners (August 2014) MRCGP Applied Knowledge Test Content Guide. RCGP Available at <http://www.rcgp.org.uk/training-exams/mrcgp-exams-overview/~media/D96EB4E0188E4355BCC9221B55859B08.ashx> (accessed 03.01.2015)
- 18 Norcini J, Anderson B, Bollela V, Burch V, Costa MJ, Duvivier R, Galbraith R, Hays R, Kent A, Perrott V, Roberts T (2011) Criteria for good assessment: Consensus statement and recommendations from the 2010 Ottawa Conference *Med Teach*. 33(3):206-14

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Table 1

Most Difficult Topic Areas	Number of responses
General medicine	294
Surgery	47
Psychiatry	126
Child health	237
Women's health	204
ENT	62
Ophthalmology	195
Dermatology	114
Genetics	170
Therapeutics	475
Research & statistics	1006
Administration & management	872
Ethics	238

Table 2

Easiest Topic Areas	Number of responses
General medicine	680
Surgery	473
Psychiatry	362
Child health	462
Women's health	487
ENT	340
Ophthalmology	215
Dermatology	477
Genetics	22
Therapeutics	126
Research & statistics	141
Administration & management	56
Ethics	132

Table 3

Reasons for why questions were found to be difficult	Number of responses
They identified gaps in my knowledge	1027
I did not understand the questions	400
The topics did not appear relevant to general practice	499
They were too time-consuming	623
I was not aware that I should know about the topic	438
Free text format made the question more difficult	169
Drag and drop format made the question more difficult	34

Table 4

Relevance of the AKT in assessing the application of knowledge	Number of responses
Overall the test assessed my knowledge of <i>important</i> problems in general practice	481
Overall the test assessed my ability to <i>apply my knowledge</i> to problems in general practice	561
Overall the test assessed my knowledge of <i>problems relevant</i> to general practice	836
Overall the test questions were <i>not relevant</i> to general practice	110
Overall the questions <i>tested the range of my knowledge</i>	664
Overall the questions <i>did not test the range of my knowledge</i>	208
Overall the questions in the test were <i>appropriate</i> for GP trainees at the end of specialty training	458
Overall the questions in the test were <i>not appropriate</i> for GP trainees at the end of specialty training	91
Overall the questions in the test were <i>unambiguous</i>	124
Overall the questions in the test were <i>ambiguous and unclear</i>	171

Table 5

Reasons identified for candidates not answering all the questions	Number of respondents
Questions were too difficult	34
Questions took too long to read	78
Questions were too complex	53
I kept reviewing questions and changing my answers	22
I found the computer format difficult to use	7

Table 6

Resources used for preparation for the AKT	Number of responses	%
Your Educational Supervisor/Trainer	309	22
Group teaching organised as part of the specialty training scheme	212	14
Other GP Specialty Trainees	337	24
RCGP Curriculum	362	26
MRCGP exam section of RCGP website e.g. sample AKT questions	495	35
RCGP educational material e.g. the Essential Knowledge Challenge	265	14
RCGP MRCGP revision course	100	7
Commercial revision material (eg onexamination, Pastest)	1225	86
Commercial MRCGP revision course	155	11

Table 7

GP specialty trainees experience in general practice in a Foundation programme?	Number of responses
No general practice post in my Foundation programme	572
One month in general practice	5
Two months in general practice	13
Three months in general practice	67
Four months in general practice	575
Five months in general practice	2
Six months in general practice	117

Table 8

Duration of GP specialty training	Number of responses
0-5 months	264
6-12 months	909
13-18 months	131
19-24 months	38
More than 24 months	33