PREPAREDNESS FOR PRACTICE: THE PERCEPTIONS OF MEDICAL GRADUATES AND CLINICAL TEAMS

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ABSTRACT

Background

Earlier research indicated that medical graduates feel unprepared to start work, and that this varies with medical school.

Aims

To examine the extent to which graduates from different UK medical schools differed in their perceptions of preparedness for practice, and compare their perceptions with those of clinical team members.

Method

An anonymous questionnaire assessing perceptions of 53 aspects of preparedness was devised, and administered to the graduating cohorts of three medical schools: Newcastle (systems-based, integrated curriculum); Warwick (graduate-entry) and Glasgow (problem-based learning). In addition, a triangulating questionnaire was cascaded via ward managers to doctors, nurses and pharmacists who worked with new graduates in their first posts.

Results

The response rate for the cohort questionnaire was 69% (479/698). The overall mean preparedness score was 3.5 (on a five-point scale), with no significant difference between schools. On individual items there were large differences *within* each site, but smaller differences *between* sites. Graduates felt most prepared for aspects of working with patients

and colleagues, history taking and examination. They felt least prepared for completing a cremation form, some aspects of prescribing, complex practical procedures, and for applying knowledge of alternative and complementary therapies, and of the NHS. Eighty clinical teams questionnaires were completed, similarly showing substantial variation within each site, but smaller differences between sites.

Conclusions

New doctors feel relatively unprepared for a number of aspects of practice, a perception shared by their colleagues. Although medical school has some effect on preparedness, greater differences are common across sites. Differences may reflect hidden influences common to all the schools, unintended consequences of national curriculum guidance, or common traits in the graduate populations sampled. Further research is needed to identify the causes.

1 Background

In recent history there have been several reforms to medical education in the UK and elsewhere. All medical schools must ensure that their graduates are competent to start work. For example, UK medical schools have a responsibility to ensure that the outcomes specified in the General Medical Council's (GMC) *Tomorrow's Doctors* are attained by students on graduation (GMC 2003, 2009), before they can be provisionally registered and start work in their first postgraduate training placement. However, undergraduate curricula are not standardised and schools deliver a diversity of approaches. The USA, on the other hand, has long had a diverse delivery of medical education. Since changes made to medical education following the Flexner Report (Flexner 1910), there have recently been further recommendations for reform (Irby et al. 2010; Prislin et al. 2010; Skochelak 2010). These include the standardisation of learning outcomes and general competencies, but with flexibility in the process of achieving these.

Despite standardisation of outcomes, differences in graduates' preparedness for the workplace in different areas of practice have been identified. One early UK study (Clack 1994) found that while a majority felt their education generally had met their needs and they had developed sufficiently in personal attributes, they did not feel that they had acquired sufficient skills and knowledge for initial practice. Later UK studies (e.g. Matheson & Matheson 2009; Brennan et al. 2010) have continued to identify lack of preparedness in some areas of practice. Goldacre et al. (2010), for example, found that 'clinical procedures' had the highest percentage of 'feeling unprepared' responses, and 'interpersonal skills' the lowest. Studies outside the UK have also identified lack of preparedness for some elements of practice (e.g. Finocchio et al. 1995; Hyppola et al. 2002; Moercke & Eika, 2002; Langdale et al. 2003; Eyal & Cohen 2006; Promes et al. 2009; Tokuda et al. 2010).

Goldacre et al.'s earlier study (2003) found that, overall, over 40% of UK medical graduates did not feel prepared for their post but identified large differences between graduates of different schools. More recent surveys have shown that perceptions of preparedness have increased but there is still wide variation between schools (Cave et al. 2007; Goldacre et al. 2010).

The current study focused on UK junior doctors starting their first year (FY1) of the two-year Foundation Programme (http://www.foundationprogramme.nhs.uk/pages/home).

2 Aim

The data presented here were collected as part of a larger study exploring the preparedness of graduates from three UK medical schools for a range of aspects of the work of a new doctor. The schools differed in curriculum and/or entry cohort – one used a relatively traditional, systems-based, integrated curriculum principally for undergraduate entrants (Newcastle), one used problem-based learning (PBL), again principally for undergraduate entrants (Glasgow) and one provided only an accelerated four-year programme for graduate entrants (Warwick).

This paper presents results from analysis of quantitative data addressing the perceived preparedness of medical graduates entering the workplace, and compares this with data on the perceptions of members of clinical teams who work with newly qualified doctors.

3 Method

Data were collected using two questionnaires, one for medical graduates ('cohort questionnaire') and one for clinical teams ('triangulation questionnaire').

3.1 Cohort questionnaire

Items reflecting fifty-three areas of preparedness were derived from an analysis of the content of *Tomorrow's Doctors* (GMC 2003); themes identified in focus groups with doctors currently undertaking their Foundation Programme (Illing et al. 2008a); items from an existing questionnaire tool used at Warwick Medical School; and review of the literature (ibid.). The questionnaire format, layout and some items were drawn from a valid and reliable questionnaire previously devised for the GMC for use with Foundation Year One doctors (van Zwanenberg et al. 2006). Items were organised into five sections: clinical and practical skills, communication skills, teaching and learning, understanding the work environment and team-working.

All items were answered on a five-point Likert response scale, ranging from 1 for 'not at all prepared' to 5 for 'fully prepared'. Demographic data were also collected, with a question to confirm the medical school attended. A final free-text box captured other comments and allowed respondents to add information.

The questionnaire was distributed to new graduates immediately before starting Foundation Programme, during induction events which the majority of the cohort were expected to attend. Questionnaires were completed at the time and returned to a member of the research team attending the session. To maximise the validity of responses the questionnaires were wholly anonymous; meaning no follow-up of non-responders was possible. The questionnaire was distributed at this point to measure the graduates' confidence as they anticipated their performance, without being confounded by their actual experience once they began work. While fewer Glasgow students attended the event at which the questionnaires were distributed, all those who received it returned it. There is no reason to suspect any difference in profiles of respondents from the three universities.

3.2 Triangulation questionnaire

Triangulation data were sought from the groups who work most closely with new doctors, who see their day-to-day practice, and so should be aware of any issues presenting at the earliest stages of FY1. In the initial development phase, qualitative interviews with medical graduates, reported elsewhere (Illing et al. 2008a, 2008b), informed the format of structured telephone interviews with staff who worked with the graduates once they moved into FY1 posts. These interviews (n=18), together with consultation with experts, were used to develop and test questions for two triangulation questionnaires (one for medical and nursing staff, one for pharmacists) thus assuring content validity in the development phase. Questions covered a number of areas of practice: clinical and practical skills (with a more detailed range of prescribing behaviour in the version for pharmacists), witnessing or awareness of errors, and communication skills. A simplified categorical response – prepared, not prepared or don't know – was used and free text comments were invited. To increase validity a 'filter item' checked that respondents worked with F1s who were graduates of the intended medical school.

The questionnaires were distributed via post to ward managers on the wards which hosted F1s in their first placement, who cascaded them to relevant clinical team members and pharmacists. It is therefore unknown how many potential recipients actually received the questionnaire.

3.3 Analysis

Data were analysed using SPSSv16. For the cohort questionnaire descriptive statistics were examined, and construct validity (that is, how much items reflect coherent underlying constructs) was tested by an exploratory factor analysis. Differences between the derived factor scores of the different schools' cohorts were examined by analysis of variance, while

the patterns of high- and low-scoring individual items were also examined. Cases with missing values were excluded on an analysis-by-analysis basis.

As the clinical teams' questionnaire used a categorical response, frequencies were examined for analysis of that data. To allow comparison between the two questionnaires, responses to cohort questionnaire items comparable to items on the clinical teams questionnaire were re-coded so that 4 or 5 equalled 'Prepared', and 1 or 2 equalled 'Not prepared'.

4 Cohort Questionnaire Results

4.1 Respondents

Table 1 gives the numbers of responses at each location and the proportion of the graduating cohorts they represent. As the entire cohort was not present when questionnaires were distributed, the proportion of the cohort responding provides a *minimum* effective response rate.

Table 1. Frequencies of responses from the three sites

	Total graduating cohort	Number of questionnaires returned	% of cohort
Glasgow	239	131	55%
Newcastle	304	226	74%
Warwick	154	123	80%
Total	698	480	69%

Based on the indicator variables of age, gender, ethnicity and reports of disability, respondents did not appear to differ from their cohort populations (see table 2).The one divergence was that the Warwick sample was close to the other sites in terms of age even though one-fifth of its cohort at entry is over thirty. The frequencies of male and female

respondents reflect national figures, with around two-thirds of medical students being female (based on comparison with acceptances at medical schools in 2002 (60.8% female) and 2003 (61.3% female) derived from figures available from UCAS) (UCAS 2009).

Table 2. Demographics for cohort populations and cohort questionnaire

Gender	Newcastle		Warwick		Glasgow	
	Population*	Q sample	Population*	Q sample	Population	Q Sample
Male	101 (41%)	84 (37%)	59 (43%)	41 (34%)	77 (32%)	41 (31%)
Female	147 (59%)	142 (63%)	77 (57%)	81 (66%)	166 (68%)	90 (69%)
Age						
20-29	232 (94%)	206 (93%)	106 (78%)	108 (92%)	232 (96%)	130 (99%)
30+	16 (6%)	10 (7%)	29 (21%)	9 (8%)	10 (4%)	1 (1%)
Not known	-	-	1 (1%)	-	1 (<0.1%)	-
Ethnicity						
White	208 (84%)	192 (81%)	121 (68%)	95 (77%)	197 (81%)	104 (80%)
Non-white	40 (16%)	31 (17%)	45 (25%)	24 (19%)	45 (19%)	25 (19%)
Not known	-	3 (1%)	12 (7%)	5 (4%)	1 (<0.1%)	1 (1%)
Reported Disability	10 (4%)	1 (<0.1%)	0	0	20 (8%)	4 (3%)

*Figures from database of those registered in 2002, so not identical to finishing cohort

4.2 Validity of responses

The following measures were taken to ensure the validity of the questionnaire. Development involving consultation with experts in undergraduate education, and focus groups with medical students and F1s ensured the content validity of items. Across sites, all items showed a skew to the upper end of the scale, but for all but one item ('Working with colleagues with different lifestyles, backgrounds or religions') the lower half of the scale was also used, indicating discriminant validity. High completion rates (no scale items had more than seven missing values) indicated that the items were intelligible and relevant, suggesting high face and content validity for the questionnaire.

4.2.1 Factor analysis

Principal components analysis (PCA) was carried out on the 53 questionnaire items, to simplify the data and establish construct validity. Because the different components were expected to correlate, reflecting underlying preparedness/self-efficacy, an oblique rotation (direct oblimin) was applied. Eleven factors with eigenvalues greater than 1 were identified (see Appendix 1 for factor loadings).

Table 3 gives the factor labels and the items which load most highly, with the proportion of variance they explain (with an oblique solution, a total variance explained cannot be calculated). This indicates that the majority of variance in the responses is explained by the complex communication, clinical judgement and self-direction factors, least by practical procedures and leadership.

Table 3. Factor labels and variance explained

Factor number	Factor label and highest loading items	Rotated sum of squares loadings (% variance explained)
1	Complex communication q25 Dealing with difficult and violent patients q24 Breaking bad news to patients and/or relatives q23 Communicating with individuals who cannot speak English, including working with interpreters q26 Applying knowledge of patient lifestyle, background or religion that may influence diagnosis and management of the patient q21 Communicating clearly, sensitively and effectively with patients and their relatives q27 Communicating with patients who have mental illness q22 Communicating effectively with colleagues from a variety of health and social care professions q28 Using knowledge of legal and ethical issues in practice	9.076
2	Practical procedures q8 Carrying out arterial blood sampling q6 Carrying out simple practical procedures (e.g. taking blood, IV access, administering oxygen) q7 Carrying out complex practical procedures (e.g. bladder catheterisation, operating syringe driver)	3.100
3	Self-direction q36 Managing your own time effectively q37 Prioritising tasks effectively q35 Identifying your own learning needs q38 Applying the principles of promoting health and preventing disease q39 Applying knowledge of how social and psychological factors impinge on patients' health and care q20 Applying the principles of holistic care	8.063
4	Professionalism q45 Taking action if colleagues' health and performance puts patients at risk q44 Managing your health in order to protect q46 Making appropriate choices to facilitate your career q43 Being honest with patients, colleagues and supervisors q42 Using knowledge of how errors can happen in practice and applying the principles of managing risks q40 Completing a learning portfolio of evidence to document your progress q41 Identifying appropriate situations in which to seek help from a senior colleague	6.914
5	Multiprofessional working q49 Respecting the roles and expertise of other health and social care professionals q48 Working with colleagues with different lifestyles, backgrounds or religions q47 Working as part of a team with other healthcare professions	5.984
6	Paperwork q18 Writing out Part A of a cremation form q17 Writing out death certificate, either real or mock q16 Calculating drug dosages q15 Writing safe prescriptions for different types of drugs	4.977
7	Examination skills q3 Performing a full mental-state examination q2 Performing a full physical examination q1 History taking q4 Pre-operative assessment of patients	6.074

8	Clinical judgment q14b Forming plans to investigate and manage a patient's problems q13 Making clinical decisions based on the evidence you have gathered q14a Assessing a patient's problems q14c Involving patients in the process of assessing, forming and managing their problems q19 Recognising and managing the acutely ill patients q5 Interpreting the results of commonly used investigations	8.209
9	Professional development q33 Gaining knowledge of legal and ethical issues (e.g. confidentiality, Mental q32 Integrating scientific principles into clinical practice q31 Using knowledge of the structures and functions of the NHS in practice q34 Applying knowledge of alternative and complementary therapies and how these may affect other treatments q30 Demonstrating, explaining to or teaching medical students and colleagues	7.243
10	Leadership q52 Asserting yourself and expressing your views clearly to colleagues q51 Demonstrating effective leadership skills q53 Handing over care of a patient (e.g. at the end of a shift) q50 Demonstrating awareness of the policies and procedures to be followed in q29 Employing a patient centred approach	2.233
11	Respiratory care q10 Carrying out basic respiratory function tests q11 Administering oxygen therapy q12 Administering a nebuliser correctly q9 Dealing with emergency care situations (e.g. CPR/Advanced life support)	6.584

4.3 Effect of medical school on perceived preparedness

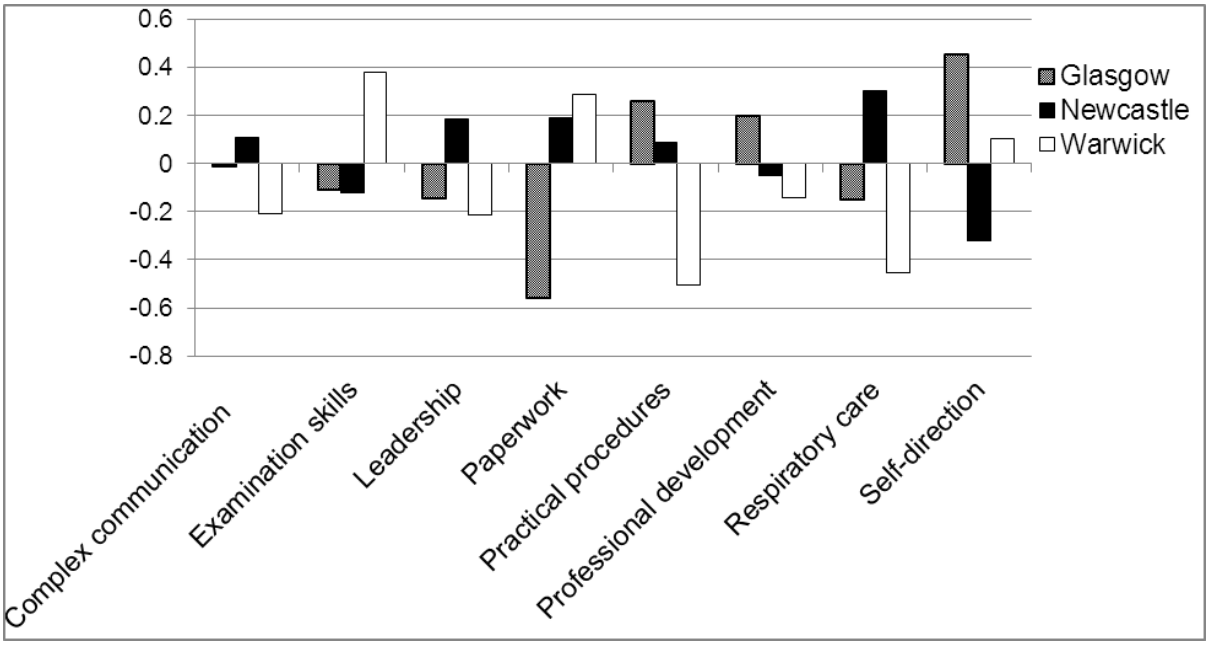
One-way analysis of variance (ANOVA) to compare the responses of the different cohorts was carried out on each of the factors (factor scores were calculated using the regression method in SPSS v16). The results summarised in table 4 indicate significant differences between medical schools on all but three of the factors. The three on which there is no difference are professionalism, multiprofessional working and clinical judgement.

Table 4. ANOVA summary table

	Sum of Squares	df	Mean Square	F	p
Complex communication	6.840	2	3.420	3.459	.032
Practical procedures	35.554	2	17.777	19.289	.000
Self-direction	47.956	2	23.978	26.862	.000
Professionalism	.801	2	.401	.400	.671
Multiprofessional working	1.556	2	.778	.777	.460
Paperwork	53.882	2	26.941	30.657	.000
Examination skills	18.998	2	9.499	9.892	.000
Clinical judgment	.096	2	.048	.048	.953
Professional development	7.428	2	3.714	3.762	.024
Leadership	14.481	2	7.240	7.458	.001
Respiratory care	42.979	2	21.490	23.765	.000

Figure 1 illustrates the pattern of difference on the 8 variables where there is a difference. The standardised factor means are shown in Appendix 1. It is clear that the order of the different schools' scores varies between factors. There is no consistency in which medical school scores highest, indicating that different schools may have strengths in different areas.

Figure 1. Significant differences between medical schools



4.4 Differences within medical schools

The differences between schools do not tell the whole story though. The patterns of scores of individual items were examined to see how preparedness for specific elements compared. It was observed that there were considerable differences *between* items within each school, and that the rank order of preparedness was similar.

Tables 5 and 6 present the ten items which have largest and smallest mean preparedness scores across all sites, alongside the 'top 10' and 'bottom 10' items for each site individually. The tables indicate there are substantial variations between items that are common to all three schools. The difference in mean score between the highest and lowest items is 1.79,

which is greater than the largest difference between schools for any one item (this was 1.03).

For the ‘top 10’ (table 5) there is a great deal of agreement between schools, with eight of the items appearing in all columns, although the precise ranking differs. The items which differ are ‘Employing a patient-centred approach’ which is replaced by ‘Identifying your own learning needs’ in Glasgow‘s ranking, and ‘Managing your health in order to protect patients and colleagues’ which is replaced by ‘Identifying appropriate situations in which to seek help from a senior colleague’ in Warwick‘s.

The ‘bottom 10’ (table 6) show more variation, but five are the same. These are ‘Writing safe prescriptions for different types of drugs’, ‘Calculating drug dosages’, ‘Carrying out complex practical procedures’, ‘Using knowledge of the structures and functions of the NHS in practice’ and ‘Dealing with difficult and violent patients’.

Table 5. The ten items with the highest mean preparedness score across all sites and the ten with the highest score for each location

Overall	Mean	Glasgow	Newcastle	Warwick
Respecting the roles and expertise of other health and social care professionals	4.41	Respecting the roles and expertise of other health and social care professionals	Working with colleagues with different lifestyles, backgrounds or religions	Respecting the roles and expertise of other health and social care professionals
Working with colleagues with different lifestyles, backgrounds or religions	4.41	Working with colleagues with different lifestyles, backgrounds or religions	Respecting the roles and expertise of other health and social care professionals	History taking
Being honest with patients, colleagues and supervisors	4.34	Working as part of a team with other healthcare professions	Being honest with patients, colleagues and supervisors	Working with colleagues with different lifestyles, backgrounds or religions
Working as part of a team with other healthcare professions	4.32	Being honest with patients, colleagues and supervisors	Working as part of a team with other healthcare professions	Working as part of a team with other healthcare professions
History taking	4.30	History taking	History taking	Being honest with patients, colleagues and supervisors
Communicating clearly, sensitively and effectively with patients and their relatives	4.13	Identifying your own learning needs	Employing a patient centred approach	Performing a full physical examination

Performing a full physical examination	4.12	Performing a full physical examination	Managing your health in order to protect patients and colleagues	Communicating effectively with colleagues from a variety of health and social care professions
Employing a patient centred approach	4.12	Managing your health in order to protect patients and colleagues	Communicating clearly, sensitively and effectively with patients and their relatives	Communicating clearly, sensitively and effectively with patients and their relatives
Managing your health in order to protect patients and colleagues	4.09	Communicating effectively with colleagues from a variety of health and social care professions	Performing a full physical examination	Identifying appropriate situations in which to seek help from a senior colleague
Communicating effectively with colleagues from a variety of health and social care professions	4.07	Communicating clearly, sensitively and effectively with patients and their relatives	Communicating effectively with colleagues from a variety of health and social care professions	Employing a patient centred approach

Table 6. The ten items with the lowest mean preparedness score across all sites and the ten with the lowest score for each location

Overall	Mean	Glasgow	Newcastle	Warwick
Administering a nebuliser correctly	3.24	Administering a nebuliser correctly	Using knowledge of legal and ethical issues in practice	Breaking bad news to patients and/or relatives
Using knowledge of legal and ethical issues in practice	3.19	Dealing with difficult and violent patients	Handing over care of a patient (e.g. at the end of a shift)	Dealing with emergency care situations (e.g. CPR/Advanced life support)
Dealing with difficult and violent patients	3.03	Writing safe prescriptions for different types of drugs	Dealing with difficult and violent patients	Writing safe prescriptions for different types of drugs
Pre-operative assessment of patients	3.02	Pre-operative assessment of patients	Pre-operative assessment of patients	Using knowledge of the structures and functions of the NHS in practice
Writing safe prescriptions for different types of drugs	2.96	Using knowledge of the structures and functions of the NHS in practice	Calculating drug dosages	Carrying out arterial blood sampling
Applying knowledge of alternative and complementary therapies and how these may affect other treatments	2.93	Writing out death certificate, either real or mock	Writing safe prescriptions for different types of drugs	Administering a nebuliser correctly
Using knowledge of the structures and functions of the NHS in practice	2.88	Carrying out complex practical procedures (e.g. bladder catheterisation, operating syringe driver)	Applying knowledge of alternative and complementary therapies and how these may affect other treatments	Carrying out basic respiratory function tests
Carrying out complex practical procedures (e.g. bladder catheterisation, operating syringe driver)	2.77	Applying knowledge of alternative and complementary therapies and how these may affect other treatments	Carrying out complex practical procedures (e.g. bladder catheterisation, operating syringe driver)	Dealing with difficult and violent patients
Calculating drug dosages	2.68	Calculating drug dosages	Using knowledge of the	Carrying out complex

			structures and functions of the NHS in practice	practical procedures (e.g. bladder catheterisation, operating syringe driver)
Writing out Part A of a cremation form	2.62	Writing out Part A of a cremation form	Writing out Part A of a cremation form	Calculating drug dosages

5 Triangulation Questionnaire Results

A total of eighty questionnaires were returned from all sites. Table 7 summarises the frequencies of responses from medical and nursing professions, and pharmacists. Respondents reported working with between one and twenty F1s in a given placement, with the majority working with fewer than eight. The majority of respondents (84%) had daily contact with F1s, with none having contact less frequently than monthly. Demographics were comparable for each site: the modal age group overall was 40-49 (though all age groups were well represented), and 50 respondents (62.5%) were female.

Table 7. Numbers of responses from different professional groups

	F2	Staff nurse	SpR/ST	Sister	Cons.	Nurse cons.	Pharm.*	Other**	Total
Newcastle		8	3	6	3	0	4	2	26
Warwick		5	2	3	2	1	5	3	21
Glasgow	1	6	4	3	10	1	8	0	33

*These pharmacists completed the separate questionnaire
**Including one nurse practitioner, one pharmacist, and three nurse specialists

There was again variation in the perceived preparedness of graduates in different areas of practice, from a mean of 93% of respondents across the three sites reporting new F1s were prepared for history taking, to only 14% reporting preparedness for naso-gastric tube insertion.

Frequencies of the cohort and triangulation questionnaires were compared, although low frequencies in the ‘Not prepared’ sides of both questionnaires meant that a significance test was not possible. However, patterns can be observed (see table 8). For many items the

proportions indicating preparedness are very close. For example, a high proportion of clinical team and cohort questionnaire respondents reported high preparedness for history taking, examination and working as part of a team. There were also similarities in perceptions of lower preparedness for clinical decision-making. Just under half of the graduates (47.7%) considered themselves to be prepared for arterial blood sampling, and 20% considered themselves unprepared. These proportions were closely matched by ratings from the clinical team respondents (56.2% and 21.9%). There were differences in perceptions of preparedness for handover, however, with clinical teams reporting higher perceptions of new F1s' preparedness.

Table 8. Percentages of triangulation and cohort questionnaire responses indicating new graduates are prepared

	Triangulation questionnaire (% indicating 'prepared')	Cohort questionnaire (% recoded to 'prepared')
History taking	93.0	94.8
Examination	87.5	87.1
Working as part of a team	84.4	90.2
Clinical decision making	40.6	43.3
Arterial blood sampling	56.2	47.7
Handover	64.1	41.9

Additional items on the questionnaire confirmed that the majority of F1s are seen as being well prepared in communication skills, in line with findings from the cohort questionnaire. Sample sizes for the triangulation questionnaire were too small to allow comparison between sites.

As with the cohort questionnaire, there was substantial variation in perceptions of preparedness within each location. Within Newcastle this ranged from 14% (IV drip) to 90% (history taking); within Warwick from 7% (IV drip) to 93% (examination and history taking), and within Glasgow from 4% (naso-gastric tube insertion) to 96% (history taking). Four items

came within the ‘top 5’ areas of highest preparedness at each site: history taking, examination, venepuncture, and working with a multi-disciplinary team. Two items came within the ‘bottom 5’ at each site: naso-gastric tube and IV drugs.

Medical and nursing respondents saw F1s as prepared for prescribing, which contrasts with the findings of the cohort questionnaire, as only 26% of the cohort perceived themselves as prepared for writing safe prescriptions for different types of drugs and 20.2% for calculating drug dosages. However responses to the pharmacist-specific questionnaire identified under-preparedness in a number of elements of prescribing. Further, the majority of pharmacists in all locations reported witnessing mistakes and near misses in all areas of prescribing, although several doctors and nurses said mistakes are not made in prescribing.

6 Discussion

This study has confirmed findings from studies within and outside the UK that have identified lack of preparedness for some elements of practice, including prescribing (Dornan et al. 2009). Graduates felt most prepared for aspects of working with patients and colleagues, history taking and examination and least prepared for completing a cremation form, some aspects of prescribing, more complex practical procedures, and for applying knowledge about alternative and complementary therapies and structures and functions of the NHS. Although there may appear to be some contradictions in the data, for example, perceptions of high preparedness for team-working and lower preparedness for handover, these may be related to the nature of the skill in question, with handover being a specific skill within the more general theme of team-working.

A key role of medical schools is to prepare medical students to take on the role of practising doctors once they graduate. Previous studies involving the perceptions of newly qualified doctors have suggested that there is considerable variation in the extent to which different

UK medical schools achieve this (Goldacre et al. 2003; Cave et al. 2007; Goldacre et al. 2010).

This study, which compared data from graduates and members of clinical teams who worked with this cohort as F1s, confirmed there are some differences between the reported preparedness of graduates of different medical schools, but demonstrates that the variation for different elements of practice *within* each school's cohort is greater than the variation *between* the schools. Thus the medical school attended does not appear to be a simple predictor of a graduate's preparedness.

6.1 Differences between medical schools

This study considered graduates from three schools with different characteristics - a systems-based, integrated curriculum principally for undergraduate entrants, one using PBL, again principally for undergraduate entrants, and one graduate entry school. There are a number of possible explanations for the differences in perceptions of preparedness between schools. They may reflect differences in selection at the schools, with consequences for the student profile, or differences in the delivery of the curriculum, teaching and learning and assessment. There may also be differences in the 'hidden' aspects of their curricula (Hafferty 1998; Lempp & Seale 2004).

Several studies have compared graduates of a traditional curriculum with those who had gone through a PBL course (Jones et al. 2002; O'Neill et al. 2003; Watmough et al. 2006a; 2006b). While there are indications that PBL programmes may be more effective at preparing trainees for their first posts, including teamwork (Frye et al. 2002), systematic reviews (including studies conducted in North America, Canada, Europe and Australia), suggest there is not conclusive evidence of a definitive effect of PBL (Koh et al. 2008, Hartling et al. 2010). It has been suggested that differences may be more to do with admissions policies rather than curriculum effects (Pearson et al. 2002).

Evidence on the impact of accelerated graduate-entry medical education is more limited, although evidence from graduate entrants on traditional five-year medical degrees indicates there are few differences between graduate and non-graduate entrants' feelings about preparedness (Goldacre et al. 2008). This suggests that graduate entry alone is not an important determinant in perceptions of preparedness.

6.2 Differences between items

The variability in preparedness for different tasks within schools must be of some concern, as it indicates there are some areas for which new doctors consistently feel, and are reported to be, under-prepared, and there is a need for these to be addressed. The common differences seen within all three schools between the various aspects of preparedness may have a number of explanations. They may reflect unintended consequences of national curriculum guidance or its implementation. They may also reflect intrinsic perceptions of readiness amongst all medical students that are unaffected by the course, or influences of the hidden curriculum (Hafferty 1998; Lempp & Seale 2004) that are common to all medical schools despite different overt curricula. The larger study (Illing et al. 2008a) identified several 'internal' factors that affected the move from student to doctor, attributable to the personalities, traits or behaviours of the trainees themselves, including their engagement in seeking out learning opportunities, as well as 'external' factors such as the location of, and support received on, clinical placements.

It may be that there are some perceptions of preparedness that can never be fully addressed until the new doctor has had the opportunity to undertake the task for real, and to succeed at it. Evidence from the qualitative data collected as part of this study (Illing et al. 2008b) suggests that this final explanation may be particularly important as the lack of opportunity to gain exposure to the realities of the work of a new doctor does seem to be a key factor in preparedness - which may be enhanced through greater opportunities for 'situated learning'

and ‘legitimate peripheral participation’ (Brown et al. 1989; Lave & Wenger 1991; Mann 2002).

Increased opportunities for participation in practice as an undergraduate may enhance future performance as well as increase competence (Wilkinson & Harris 2002) and help foster the link between formal and experiential knowledge that may be key to the development of expertise in medicine (Norman 2006; Irby et al. 2010). The amount of experiential learning and responsibility provided during the shadowing period immediately prior to starting Foundation Year One may be an additional factor (Berridge et al. 2007; Illing et al. 2008b; Matheson et al. 2010). As well as educational benefits of active student participation (Dornan et al. 2006), there may also be wider benefits for patient care, for example in a recent study in Germany patients and staff members recorded a positive impact of an ‘active student participation’ programme for final year medical students (Scheffer et al. 2010). In the USA there have been recent recommendations for greater integration of formal learning with clinical experience, with students being provided with early clinical immersion and learners taking on ‘the multiple professional roles and commitments associated with being a physician’ (Irby et al. 2010:224). In the UK, the ‘Student Assistantships’ introduced in the GMC’s revision of *Tomorrow’s Doctors* following the overall study (Illing et al. 2008b) may have an important role to play in this respect (GMC 2009). Further, the findings regarding the benefits for F1s of working with, and being supported by clinical teams, and pharmacists in particular, may have implications for learning through interprofessional collaboration in the workplace. This is an area that warrants further research.

6.3 Limitations

It must be recognised that, although used in similar studies elsewhere (Goldacre et al. 2003; Cave et al. 2007; Goldacre et al. 2010), the self-reporting of perceived preparedness (particularly when assessed prior to starting work) is a potential limitation of this study. However, perceptions of ability are precursors to behaviour (Bandura 1986), and so should

not be dismissed. In this study the triangulating data from experienced staff who subsequently worked with this cohort of students largely confirmed their perceptions, as did follow-up interviews with graduates four and twelve months into their F1 year (Illing et al. 2008b).

A smaller proportion of medical graduates from Glasgow completed the cohort questionnaire than at Newcastle and Warwick due to the lower attendance at the event at which questionnaires were distributed. However, responses were still received from over half the Glasgow graduating cohort. There are no specific reasons to suggest the views of this sample may differ from those of the full cohort, and the results show commonality with the graduating cohorts from the other two medical schools.

The study only considered the outcomes of three UK medical schools; it is not known whether these schools are truly representative of graduates from all UK medical schools, nor if they generalise to other settings, countries or systems. This is an area that warrants further research.

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Ethical approval

This study received ethical approval from the NHS National Research Ethics Service (Cambridgeshire 1 Research Ethics Committee).

Declaration of interest

The authors report no conflicts of interest. The authors alone are responsible for the content and writing of the article.

Practice points

- Previous research has found that medical graduates feel unprepared to start work and that, despite nationally standardised learning outcomes, this varies with medical school. This quantitative study, based on graduates from three UK medical schools with different types of curriculum confirmed this finding.
- Furthermore, team members' perceptions of preparedness to a great extent mirrored the self-perceptions of recent graduates.
- Although there was no significant difference between schools on overall preparedness, on individual items there were differences between sites but the differences between items *within* each site were greater.
- Graduates felt most prepared for working with patients and colleagues, history taking and examination and least prepared for completing a cremation form, some aspects of prescribing, more complex practical procedures, and for applying knowledge about alternative and complementary therapies and structures and functions of the NHS.
- The low levels of preparedness for some tasks are of concern. It is proposed that this would be best addressed by maximising the opportunities for active student participation in practice during their course.

Declaration of interest

The authors report no conflicts of interest. The authors alone are responsible for the content and writing of the article.

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Appendices

1. Component pattern matrix.

Note: Loadings less than .1 are not shown, while loadings greater than .4 are in bold.

	Questionnaire items	1	2	3	4	5	6	7	8	9	10	11
Complex communication	q25 Dealing with difficult and violent patients	**.799**					.101		-.111			
	q24 Breaking bad news to patients and/or relatives	**.791**			.111				-.177			
	q23 Communicating with individuals who cannot speak English, including working with interpreters	**.638**					.149		.126	-.145		
	q26 Applying knowledge of patient lifestyle, background or religion that may influence diagnosis and management of the patient	**.571**				.125				-.156	.108	
	q21 Communicating clearly, sensitively and effectively with patients and their relatives	**.564**				.315		.198				
	q27 Communicating with patients who have mental illness	**.512**						.216		-.286		
	q22 Communicating effectively with colleagues from a variety of health and social care professions	**.471**		.174		.218		.143				
	q28 Using knowledge of legal and ethical issues in practice	**.462**				-.176		.124		-.452		
Practical procedures	q8 Carrying out arterial blood sampling	.111	**.633**	.126								.176
	q6 Carrying out simple practical procedures (e.g. taking blood, IV access, administering oxygen)		**.566**						-.106			.336
	q7 Carrying out complex practical procedures (e.g. bladder catheterisation, operating syringe driver)		**.522**			-.150		.194		-.135		.229
Self-direction	q36 Managing your own time effectively			**.798**								
	q37 Prioritising tasks effectively			**.739**							-.196	-.145
	q35 Identifying your own learning needs		.116	**.669**		.169						.102
	q38 Applying the principles of promoting health and preventing disease			**.466**	.158					-.246	.220	
	q39 Applying knowledge of how social and psychological factors impinge on patients' health and care	.155	-.140	.344	.132	.244			-.178		.328	.138
	q20 Applying the principles of holistic care		-.159	.306	-.119	.235	.141		-.233	-.175	.279	.176
Professionalism	q45 Taking action if colleagues' health and performance puts patients at risk	.109			**.703**					-.102		
	q44 Managing your health in order to protect		.160		**.691**	.303						-.115
	q46 Making appropriate choices to facilitate your career		-.127		**.603**						-.159	
	q43 Being honest with patients, colleagues and supervisors		.227		**.525**	.463					.121	
	q42 Using knowledge of how errors can happen in practice and applying the principles of managing risks	.102		.186	**.462**		.164				-.118	
	q40 Completing a learning portfolio of evidence to document your progress	.292		.273	**.435**	-.104			.119		.206	.306
	q41 Identifying appropriate situations in which to seek help from a senior colleague			.286	.397	.118	.142	.121		.185	-.212	
Multiprofessional working	q49 Respecting the roles and expertise of other health and social care professionals					**.788**						.103
	q48 Working with colleagues with different lifestyles, backgrounds or religions					**.787**						
	q47 Working as part of a team with other healthcare professions				.167	**.662**		.116			-.217	

	Questionnaire items	1	2	3	4	5	6	7	8	9	10	11
Paperwork	q18 Writing out Part A of a cremation form		-.150				**.795**					
	q17 Writing out death certificate, either real or mock			-.125		.157	**.687**		-.116		.139	.175
	q16 Calculating drug dosages		.221	-.202	.168	-.129	**.570**			-.150		.149
	q15 Writing safe prescriptions for different types of drugs		.270	.142	.142	-.169	**.542**		-.147			
Examination skills	q3 Performing a full mental-state examination		-.254	-.170				**.777**	-.114	-.137	.105	
	q2 Performing a full physical examination		.242			.105		**.744**				
	q1 History taking	.101	.143			.166		**.719**		.102		
	q4 Pre-operative assessment of patients					-.243	.235	**.515**				.120
Clinical judgement	q14b Forming plans to investigate and manage a patient's problems			.109					-.765			-.141
	q13 Making clinical decisions based on the evidence you have gathered							.129	-.685		-.184	.158
	q14a Assessing a patient's problems							.152	-.682			
	q14c Involving patients in the process of assessing, forming and managing their problems	.142				.145	.219		-.597	-.105	.150	
	q19 Recognising and managing the acutely ill patients			.153			.140		-.476			.247
	q5 Interpreting the results of commonly used investigations		.336	.151				.141	-.374			
Professional development	q33 Gaining knowledge of legal and ethical issues (e.g. confidentiality, Mental		.103	.153					-.117	-.653		
	q32 Integrating scientific principles into clinical practice		.139		.125				-.181	-.618		
	q31 Using knowledge of the structures and functions of the NHS in practice				.144		.151			-.571	-.239	
	q34 Applying knowledge of alternative and complementary therapies and how these may affect other treatments		-.357	.196			.202	.104		-.485		.119
	q30 Demonstrating, explaining to or teaching medical students and colleagues	.199	.170			.124	.183			-.430		
Leadership	q52 Asserting yourself and expressing your views clearly to colleagues			.139	.102	.243			-.227	-.159	-.540	
	q51 Demonstrating effective leadership skills	.223		.172		.227				-.107	-.533	.153
	q53 Handing over care of a patient (e.g. at the end of a shift)	.110	-.124	.216	.184		.183				-.395	
	q50 Demonstrating awareness of the policies and procedures to be followed in	.114			.272	.184				-.266	-.392	.105
	q29 Employing a patient centred approach	.314				.296			-.149	-.138	.371	.107
Respiratory care	q10 Carrying out basic respiratory function tests								-.169			**.775**
	q11 Administering oxygen therapy						.169					**.717**
	q12 Administering a nebuliser correctly		.173				.169		.152	-.113		**.670**
	q9 Dealing with emergency care situations (e.g. CPR/Advanced life support)	.149	.127					.157	-.338	.111		.388

2. Mean standardised factor scores for each medical school

		N	Mean	Std. Deviation
Complex communication	Warwick	100	-0.21	0.98
	Glasgow	123	-0.01	1.10
	Newcastle	208	0.11	0.93
Practical procedures	Warwick	100	-0.50	0.94
	Glasgow	123	0.26	1.06
	Newcastle	208	0.09	0.91
Self-direction	Warwick	100	0.10	0.85
	Glasgow	123	0.46	0.99
	Newcastle	208	-0.32	0.96
Professionalism	Warwick	100	-0.05	0.89
	Glasgow	123	0.06	1.08
	Newcastle	208	-0.01	1.00
Multiprofessional working	Warwick	100	-0.07	1.11
	Glasgow	123	0.09	0.88
	Newcastle	208	-0.02	1.01
Paperwork	Warwick	100	0.29	0.92
	Glasgow	123	-0.56	1.09
	Newcastle	208	0.19	0.84
Examination skills	Warwick	100	0.38	1.02
	Glasgow	123	-0.11	1.00
	Newcastle	208	-0.12	0.95
Clinical judgment	Warwick	100	-0.02	0.95
	Glasgow	123	-0.01	0.98
	Newcastle	208	0.01	1.04
Professional development	Warwick	100	-0.14	0.92
	Glasgow	123	0.20	1.07
	Newcastle	208	-0.05	0.98
Leadership	Warwick	100	-0.22	0.88
	Glasgow	123	-0.14	0.91
	Newcastle	208	0.19	1.07
Respiratory care	Warwick	100	-0.46	0.96
	Glasgow	123	-0.15	1.05
	Newcastle	208	0.31	0.88