Medical Education

The objective structured interview for medical student selection

D A POWIS, R L B NEAME, T BRISTOW, L B MURPHY

Abstract

An objective structured interview is an integral part of the process of selecting and admitting applicants to study medicine at this university. During the nine years (to the end of 1986) that the interview has been used 1600 candidates were interviewed out of roughly 13 000 applicants, and from these, 584 students were admitted to the course. Analysis of the interview data was carried out based on two aspects of student progress: graduation with honours and failure to complete the course of study.

The interview as a whole, and especially some of the subscales, appears to identify students who may fail to complete the course: it may also help to predict which students are likely to graduate with honours.

Introduction

Almost all societies restrict the numbers of medical students entering public medical schools. Most limit numbers on the basis of previous academic performance on the grounds of fairness. As the pressure for entry has increased, so has the academic standard required for admission. The effectiveness of this approach is doubtful since there has been repeated failure to show any but weak associations between academic ability and the outcome of studies.[1-3] It has also resulted in changes in the characteristics of those who become doctors. For example, Parlow and Rothman showed that the increasing intellectual ability of students entering medicine over six years was associated with a decrease in flexibility, innovation, and tolerance of ambiguity.[4] This seems incompatible with the characteristics required in many clinical situations. Others have drawn attention to the "cloning" of medical graduates, to the diminution in creative and original "divergent" personalities, and to diminishing motivation and vocation.[5,6] Bruhn raised similar concerns and advocated admitting and graduating doctors who could resist uniformity and generate ideas for change.[7]

The failure of students to gain entry to medical school despite high vocation and motivation, and despite eminently desirable personal and humanistic qualities, is a cause for concern. Such concern has led to pressure to consider alternative and more effective student selection criteria,[8,9] aimed, for example, at choosing candidates with qualities appropriate for further development rather than selecting students without these qualities and subsequently trying to develop them.

A wide range of non-cognitive data about each applicant is available to admissions committees. These have been divided into two groups: "political," such as age, sex, domicile, race, socioeconomic state, schooling, etc—factors over which the student has no control; and "background," such as interests, motivation, personality, aspirations, communication skills, style, etc—factors for which the person might be expected to be accountable.[10] The use of factors in the "political" group as student selection criteria may be divisive and discriminatory, at least sometimes,[11] but factors in the "background" group may usefully augment academic performance criteria in the admissions process.

In some medical schools admissions interviews are used to supplement academic testing procedures. These offer the opportunity to search for appropriate non-cognitive characteristics, but in many centres there is no agreement on the measures, and the data available to admissions committees tend to be used inconsistently in student selection[12,13] and to lack objectivity.[14] Undoubtedly, however, interviews for admission have the potential to change the character of the professional body.[15]

Here we present the findings obtained through the use of a structured admissions interview as an integral part of medical student selection at this university.

Methods

At the University of Newcastle there are two modes of entry to the medical school: the academic mode and the composite mode.[16] Notionally there is a roughly equal distribution between the two modes. The admission of students through the academic mode is based solely on their academic achievement (marks in the top 1-2% in the New South Wales Higher School Certificate Examination or its equivalent, or "distinction" level in tertiary studies at a university or college of advanced education). This selection mode is in line with other medical schools in New South Wales.

Those who are selected to enter through the composite mode are academically able, having achieved marks within the top 2-10% of the NSW Higher School Certificate or its equivalent or close to a "credit" average in studies at a tertiary institution. These composite stream students are selected on the basis of their performance in an assessment of personal qualities which comprises written psychometric tests and a structured personal interview.[17,18] Regardless of their entry mode all applicants are required to sit the written tests and attend an interview.

The characteristics sought in applicants through interview are: (*i*) Compatibility with the innovative style of studies at the university.[19] (*ii*) Perseverance: the ability to persist in the face of setbacks and frustrations. (*iii*) Tolerance of ambiguity: acceptance of the reality that decisions and actions may be necessary in the face of uncertainty. (*iv*) Supportiveness: the ability to lend strength to others under pressure or in time of need, or both. (*v*) Motivation: personal realistic desire to become a doctor. (*vi*) Self confidence: ability to communicate with others without excessive shyness or diffidence and to formulate views and communicate them clearly. The personal qualities covered by the six characteristics rated at the interview were identified by the admissions committee through

Faculty of Medicine, University of Newcastle, NSW 2308, Australia
D A POWIS, BSC, PHD, senior lecturer in human physiology
R L B NEAME, MB, PHD, senior lecturer in human physiology
T BRISTOW, BA, professional officer, admissions
L B MURPHY, BA, MA, fellow in medicine

Correspondence to: Dr Powis.

discussion in the founding faculty and the local and national medical community. The qualities sought compare with those of Ben Gurion University of the Negev at Beer Sheva, Israel.[20,21]

During 1978-86 there were roughly 700 academically eligible applicants per year who were subsequently invited to the university for psychometric tests to determine a range of personal qualities. Thereafter about 180-200 applicants were invited for the personal interview. This paper focuses on the interview component of the selection process at Newcastle.

THE INTERVIEW

The interview aims at seeking objective information on a range of personal qualities and attitudes. The following procedure has been devised and implemented for the past nine years.

Each interview is conducted by two people, a full time member of the academic staff of the medical school and a representative of the community, who is usually non-medical and often has no connections in the medical profession. If the applicant is a woman the team would normally include a woman.

Each interviewer is trained for one to two hours each year before participating. During this session interviewers are given an outline of the format of the interview and a brief synopsis of the background to the selection technique used. They are supplied with an interview manual which gives an introduction to the aims and purposes of the interview, an outline of the general approach to be adopted, and a definition and detailed discussion of each of the attributes to be assessed during the interview.

For the interview to be useful in supplementing the formal psychometric tests we believe that it is of the utmost importance that the applicants should feel that the faculty is genuinely interested in their personal views and feelings. Thus in training interviewers we emphasise the following interview techniques: (*i*) creating a friendly atmosphere, (*ii*) indicating that we are more interested in exploring the candidates' views and feelings than their verbal facility, and (*iii*) ensuring that all the topics listed for discussion are adequately sampled during the interview.

To avoid any possible bias interviewers are provided only with the candidate's name and age.

To cover the essential points and ensure some standardisation several hypothetical problems and discussion points, related to the specified topics, have been prepared for use by the interviewers. We cannot give any more specific details of the content of the interview because we are still using it.

Rating the interview

The interview normally lasts about 45 minutes, which gives roughly nine minutes for discussing the first five characteristics/traits. "Self confidence" is assessed on the basis of impressions gained during the whole interview.

The individual interviewers are required at the conclusion of each interview to rate independently each characteristic before there is any discussion between interviewers. A specially designed rating form is used which gives space for a written assessment of the rated quality before its rating on a 1 (best) to 5 (worst) scale. Prefacing the rating with space for written comment is deliberate, so that we can avoid interviewers assigning an arbitrary score and then justifying this with their written comments. No special formula is offered for the overall rating computation, but it would be unusual for this to be other than a general reflection of the individual subscores.

Only when they have completed the individual ratings are the interviewers permitted to discuss the candidate. The goal of the discussion is to compare opinions, and to achieve an agreed joint rating of each quality and of the overall score. If the interviewers cannot agree the candidate may be asked to return for limited further questioning in an attempt to resolve the matter. If this fails, or if the initial interviewers decide against this approach, the candidate is reinterviewed, if possible on the same day, by a different team. No information is given to the second team except that the first team could not reach agreement. The candidate is advised that no criticism is implied by the need to reinterview.

Method of analysis

Two readily identifiable and distinct measures of outcome were studied: failure to complete the course and graduation with honours. Each student who fell into these groups was matched with a control student from the remainder of the student body (see below). Wilcoxon matched pairs signed ranks non-parametric statistical analysis was used for these comparisons.[22,23] A non-parametric test was selected since the data were neither continuous nor normally distributed.

Results

Over the past nine years roughly 1600 candidates were interviewed according to this scheme. Table I summarises the overall scores. Most of the applicants created a favourable impression: roughly three out of five were rated either "highly outstanding" or "good quality" candidates (score 1-2), while only one in five applicants was rated "barely suitable" or "frankly unsuitable" for admission (score 4-5).

Places were allocated to applicants entering under the composite stream based on their interview scores: scores of 1 took precedence over scores of 2; only if places remained were candidates with scores of 3 considered. Interview scores had no influence on the allocation of places to those entering through the academic stream: hence some academic stream candidates were admitted with interview scores of 4 or 5— that is, with ratings indicating that the interview team had definite reservations (table I).

INTERVIEW RELIABILITY

The interview training procedures that were introduced to achieve consistency and reliability have been successful. Analyses were performed for each of the six separately rated qualities as well as for the overall ratings. Comparisons were made between academic and community interviewer ratings, between academic interviewers and the joint interview rating, and between community interviewers and the joint interview rating. The extent of agreement based on unweighted kappa statistical analysis was uniformly high, with highly significant T-values being obtained in every case. Kappa scores ranged from 0·225 to 0·630 and standard errors from 0·026 to 0·032. The ratings on component scales by non-faculty interviewers relate slightly better to combined team ratings (0·593 to 0·630) than is the case with faculty interviewers (0·492 to 0·609), but such small differences were not significant. The mean scores for component and overall ratings were broadly similar for the two groups of assessors.

TABLE I—*Distribution of ratings given by interview team*

Rating and description of candidate	Total No (%) interviewed (n=1609)	Total No (%) admitted (n=584)*
1 Highly outstanding	265 (16·5)	134 (22·9)
2 Good quality	662 (41·1)	302 (51·7)
3 Adequate	367 (22·8)	102 (17·5)
4 Barely adequate	265 (16·5)	38 (6·5)
5 Unsuitable for admission	50 (3·1)	8 (1·4)

*Applicants who were interviewed and offered a place to study medicine and accepted that offer.

TABLE II—*Mean interview score for each interview characteristic for the students who failed to complete the course (W/E) and matched controls (n=56)*

Interview characteristic	Academic mean SEM)*	Community mean SEM)*	Joint mean (SEM)*
Compatibility with Newcastle study styles:			
W/E	2·12 (0·14)	2·11 (0·12)	2·23 (0·14) p<0·05
Controls	1·89 (0·11)	1·89 (0·12)	1·87 (0·1)
Perseverance:			
W/E	2·09 (0·14)	1·98 (0·12)	2·02 (0·13)
Controls	1·84 (0·1)	1·77 (0·1)	1·79 (0·1)
Tolerance of ambiguity:			
W/E	2·37 (0·14)	2·21 (0·13)	2·25 (0·13)
Controls	2·21 (0·12)	2·07 (0·11)	2·14 (0·11)
Supportive and encouraging behaviour:			
W/E	2·45 (0·14) p<0·0085	2·41 (0·13) p<0·027	2·39 (0·13) p<0·0064
Controls	1·91 (0·12)	1·87 (0·12)	1·89 (0·11)
Motivation to become a doctor:			
W/E	2·25 (0·15)	2·32 (0·14)	2·36 (0·14) p<0·0366
Controls	2·00 (0·14)	1·93 (0·12)	1·91 (0·12)
Self confidence:			
W/E	2·05 (0·14) p<0·006	2·09 (0·13) p<0·027	2·11 (0·13) p<0·0098
Controls	1·57 (0·09)	1·70 (0·11)	1·66 (0·01)
Overall:			
W/E	2·68 (0·14) p<0·005	2·54 (0·13)	2·55 (0·15) p<0·0374
Controls	2·11 (0·12)	2·27 (0·13)	2·14 (0·11)

*p value shows level of significance according to Wilcoxon matched pairs signed ranks test.

Using these data we based the analyses which follow on the joint interview rating, which is the rating used for admissions, rather than on the individual ratings of the two team members.

PREDICTING FAILURE TO COMPLETE THE COURSE

In the group who failed to complete the course were those students who withdrew voluntarily (n=46) and those who were excluded from the course on academic grounds (n=13). The reasons for withdrawal given at departure included lack of motivation for study generally, or study of medicine in particular, incompatibility with the curriculum, and a variety of personal reasons. The uniformly high level of academic achievement shown by students before their admission to medical school suggests that "academic failure" simply indicates a lack of motivation to study for whatever reason, and thus the students who withdrew or were excluded were combined into a single group for most of the analyses that follow.

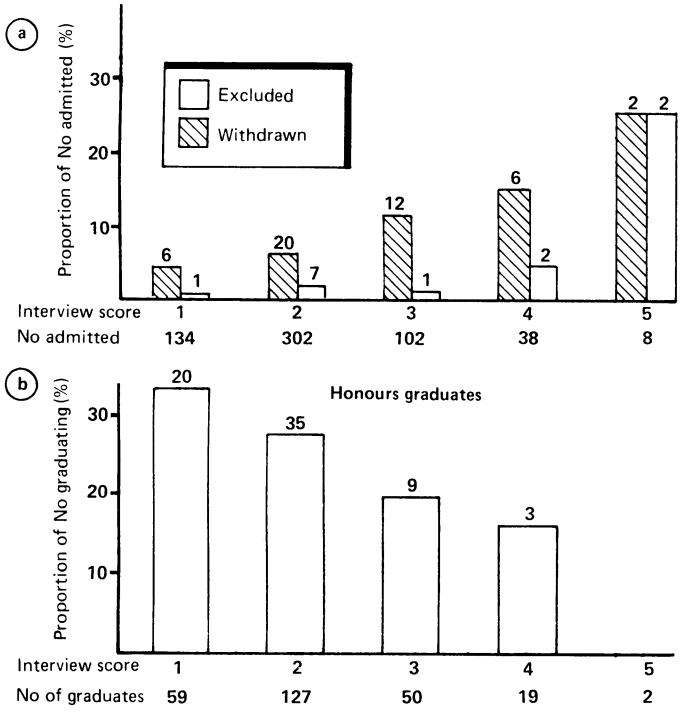
The scores at interview for the non-completing (withdrawn/excluded) students (n=59) were compared with those obtained by a group of continuing students matched on a case-control basis. Characteristics matched in the analysis were: (*i*) year of entry to the course; (*ii*) sex; (*iii*) mode of entry (academic stream or composite stream); (*iv*) secondary or tertiary entry (direct entry from secondary school or after tertiary studies); (*v*) age at entry. It was not possible to match three of the non-completing students with controls by the above characteristics: hence the sample size for analysis was reduced to 56. It was also not possible to match precisely age at entry: case-control age discrepancy averaged 3·89 years (n=56; range 0-14; SD=4·12).

Significant differences were found between the non-completing students and the controls in relation to the following joint interviewer ratings:

1 Compatibility with Newcastle study styles ($p<0·05$)
2 Supportive and encouraging behaviour ($p<0·007$)
3 Motivation towards medicine ($p<0·04$)
4 Self confidence ($p<0·01$)
5 Overall rating ($p<0·04$).

In every case the students who failed to complete the course were rated significantly poorer than the matched controls. Table II gives the entire matrix of data for the academic, community, and joint interview ratings for non-completing students and their matched controls; for every cell throughout the matrix the controls were rated better at the admissions interview than the non-completing students.

An alternative approach to analysis of these data is shown in part (*a*) of the figure. The number of students admitted with a given interview score who failed to complete the course, expressed as a percentage of all those admitted with that interview score, increased steadily from 5% of those scoring 1 to 50% of those scoring 5. Numbers in the group scoring 5 on interview were too small to be included in any statistical analysis: however, if the interview scores 4 and 5 were combined into a single group χ^2 analysis shows that the trend is highly significant ($p<0·005$); simply omitting the interview score 5 group from the analysis also showed that the trend is highly significant ($p<0·025$).



(a) The proportion of students who withdrew or were excluded from admission to medical school shown by interview score. (b) The proportion of students who graduated with honours in five cohorts of graduates in 1983-7 shown by interview score. Numbers are also given.

GRADUATION WITH HONOURS

In five student cohorts totalling 257 graduates, 67 students were awarded honours. Honours are awarded only to students who have shown excellence in every aspect of the course; for a description of this comprehensive assessment see Feletti *et al.*[24]

The scores at interview for the students who graduated with honours (n=67) were compared with those obtained by a group that graduated without honours matched on a case-control basis. The same characteristics were matched as for the previous comparisons. Nine of the honours graduates could not be matched with controls; and for analysis the sample size was reduced to 58. In addition, it was not possible to match age at entry precisely: case-control age discrepancy averaged 2·72 years (n=58; range 0-11; SD=3·00).

From this analysis two subscales may be singled out: "perseverence," where honours graduates scored significantly better ($p<0·04$) than their non-honours matched controls; and "self confidence," where the difference just failed to reach significance ($p<0·09$). Once again for the entire matrix of comparisons the honours graduates scored better than their matched controls (table III).

TABLE III—*Mean interview score for each interview characteristic for students who graduated with honours and matched controls who graduated without honours (n=58)*

Interview characteristic	Academic mean (SEM)*	Community mean (SEM)*	Joint mean (SEM)*
Compatibility with Newcastle study styles:			
Honours	1·59 (0·11)	1·72 (0·11)	1·69 (0·1)
Controls	1·76 (0·09)	1·79 (0·11)	1·72 (0·1)
Perseverance:			
Honours	1·60 (0·09)	1·60 (0·1) p<0·0232	1·57 (0·08) p<0·0359
Controls	1·78 (0·1)	1·91 (0·1)	1·84 (0·1)
Tolerance of ambiguity:			
Honours	1·86 (0·11)	2·03 (0·12)	1·93 (0·11)
Controls	2·12 (0·13)	2·03 (0·1)	2·05 (0·12)
Supportive and encouraging behaviour:			
Honours	1·91 (0·12)	1·83 (0·11)	1·86 (0·1)
Controls	1·95 (0·11)	1·86 (0·11)	1·95 (0·11)
Motivation to become a doctor:			
Honours	1·83 (0·14)	1·86 (0·11)	1·90 (0·12)
Controls	2·00 (0·14)	1·91 (0·12)	1·95 (0·13)
Self confidence:			
Honours	1·48 (0·08) p<0·03	1·45 (0·09) p<0·07	1·43 (0·09) p<0·085
Controls	1·78 (0·1)	1·71 (0·11)	1·69 (0·11)
Overall:			
Honours	1·88 (0·11)	1·97 (0·11)	1·93 (0·1)
Controls	2·15 (0·13)	2·14 (0·11)	2·17 (0·12)

*p value shows level of significance according to Wilcoxon matched pairs signed ranks test.

Part (*b*) of the figure shows an alternative analysis of these data. Here the number of students who graduated with honours for each admission score is expressed as a percentage of all those who were admitted with that interview score. These percentages decline from 34% of those scoring 1 at interview to 0% of those scoring 5. A clear trend emerges from these data, but does not reach significance.

ACADEMIC GRADE COMPARISONS

Both the non-completing students and their controls and the honours graduates and their controls were compared by their academic ability at entry. There was no significant difference between either of the test groups and their respective control group, for either secondary or tertiary entrants. Means (SD) for the secondary entrants based on school leaving examinations were: honours graduates 685·1 (29·3) and controls 679·7 (32·4); withdrawn/excluded students 687·5 (34·8) and controls 689·9 (33·9). For the tertiary entrants means (SD) based on university grade point averages were: honours

graduates 3·23 (0·6) and controls 3·19 (0·5); withdrawn/excluded students 3·38 (0·7) and controls 3·32 (0·5).

Discussion

Every student who embarks on a medical curriculum may be assumed to have the academic ability to complete the course; hence the cause for failure should be sought elsewhere. Our data support this assertion. Firstly, the mean academic score with which the withdrawn/excluded student entered the course is no worse than that of the matched continuing student. Secondly, the data for the structured interview indicate that the withdrawn/excluded students performed consistently worse in all non-cognitive domains than did their matched controls. Moreover, the mean academic score of the honours graduates at entry was no better than that of the matched controls, or, indeed, than that of the withdrawn/excluded group of students.

There are many reports of correlations between non-cognitive criteria and success in medical studies and thereafter. Two distinctive descriptions of the successful student may be abstracted. The first is the "academic" success, the student who excels in preclinical studies: he or she tends to be an introvert, converging towards the conforming, civilised, self controlled, conventional, conservative, sober, disciplined, and purposeful individual. Catell *et al* showed that bright, self sufficient introverts tend to do well scholastically.[25] Rothman and Parlow and Rothman in studies on students entering medicine described high indexes of achievement and endurance and low indices of "play" and impulsivity among this population.[4 26] They also identified these individuals as tending towards inflexibility, having difficulty with adapting and with innovation: these students needed a rigid and structured environment and tended to avoid ambiguity.

By contrast in the clinical environment the successful student tends to be motivated, emotionally expressive, secure, sensitive, independent, spontaneous, and communicative, with an orientation towards power and status. Success is correlated with a degree of extraversion, exhibition, and impulsivity in a student who is relaxed and emotionally secure.[27] These qualities may have advantages clinically—for example, in problem solving styles.[28] Clinical success is also associated with strong motivation,[2 29] a similar quality to endurance. Factors such as maturity, patient rapport, and integrity are important for clinical success but are not correlated with academic achievement.[2 30] Solkoff suggested that the higher ranked students were more sensitive than the lower ranked students[31]; others have noted power and status associated traits.[32 33]

It would be inaccurate to represent the clinical environment as homogeneous or to imply that homogeneity is desirable in graduates. Several authors have drawn attention to this, proposing separate admissions programmes based on non-cognitive selection procedures for different medical careers[8] and different study programmes to accommodate this variation.[34]

It has been argued that many of the traits shown by "academic" success are the reverse of those likely to be advantageous in a clinician[7]—for example, introversion, lack of creativity and adaptability, and inflexibility. In particular the need for structure is at odds with innovative and less structured approaches to study, such as the problem based course at this university.

Many, but not all, of the characteristics listed above are sought in our admissions process—for example, motivation, self confidence and communication, and perseverance. Probably the interview dimension which is labelled "supportive/encouraging" may be associated with extraversion, and "self confidence" embraces in part the emotional security factor. The "compatibility with Newcastle study styles" is the reverse of the indexes of rigidity and "needing structure in learning" reported above, although the ability to work with and communicate with others in small groups is sought as part of this characteristic.

Further support for the assertion that predictors of success or failure in a medical course should be sought in the non-cognitive area is found in the data which link graduation "with honours" to a higher than average performance in the non-cognitive domains evaluated at interview—and which link withdrawal/exclusion with a lower than average performance in these same non-cognitive domains.

Conclusion

The structured admissions interview as used at this university can predict in some measure ultimate failure or success in medical studies. At the very least such an approach should be seriously considered for trying to predict which students are unlikely to complete the course. As regards graduation with honours, possibly the criteria for this will vary from place to place depending on the stated objectives of the course of study, but our data suggest that selecting interview criteria that are relevant to institutional goals may contribute to improved student performance.

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