



*Dr Rachel Clarke*



*Dr Tim Littlewood*

## ‘Haematophobia?’ – attitudes of Oxford medical students towards haematology

**M**edical students’ views of haematology are little researched. Dr Clarke and Dr Littlewood set out to address this gap by eliciting attitudes to and competence in haematology among final year medical students. It appears haematology is seen as a particularly difficult specialty but nevertheless a popular and interesting career choice. The lack of some important clinical knowledge on the eve of starting FY1 is a concern, and this together with the plea for greater exposure to haematology teaching should be borne in mind by those drafting the national curriculum in haematology.

Is haematology well taught in medical schools? If it were, novice doctors would arrive on the wards both confident and competent in managing common blood disorders. Yet our experiences, either teaching haematology to medical students (TL) or until recently having been one (RC), suggest a general consensus amongst the student cohort that the subject, whether well taught or not, can be both difficult and daunting.

Such views are not unique to haematology. So familiar are neurologists, for example, with medical students’ and doctors’ fear of the neural sciences and clinical neurology, they have even coined a name for it: ‘neurophobia.’<sup>1</sup> Are medical students ‘haematophobic’ as well, and if so, why?

Literature review reveals a surprising lack of definitive guidance on how haematology is best taught, who should be responsible for its teaching and what a haematology curriculum should cover. Most striking is the dearth of papers investigating students’ perceptions of the subject. We sought to address this shortfall in existing knowledge by evaluating (a) final year medical students’ views of haematology and (b) their level of competence in managing the kinds of common blood disorders faced by Foundation Year 1 (FY1) doctors.

In Oxford, students receive about 10–15 hours of tuition on the basics of haematopoiesis and coagulation during their first 2 years of pre-clinical training, followed by another 15 hours of lectures and tutorials during a pathology course in their first clinical year. Approximately half the students also do a 2-week special study module (SSM) in clinical haematology during their final year when they will have the opportunity to see both in- and out-patients and receive four to six tutorials.

To our knowledge, the questionnaire we devised for Oxford finalists is the first attempt to set medical students’ subjective views of haematology in the context of an objective assessment of their ability.

### **Methods: testing attitudes and competence**

We searched MEDLINE and EMBASE for English language papers, without date restriction, using the terms ‘haematology’, ‘education’, ‘teaching’, ‘medical student’, ‘undergraduate’ and their synonyms. All potentially relevant abstracts were retrieved and read in full. They informed the drafting and piloting of a two-part questionnaire which we elected to distribute to final year medical students at Oxford University at a pivotal point in their education, during their ‘Preparation for Practice as a Doctor’ course. In Oxford, this course marks the transition from medical student to doctor, occurring just after the completion of academic study and immediately prior to the commencement of FY1. Any shortfall in students’ knowledge of or confidence in haematology at this stage will be carried through into actual clinical practice.

Section 1 of the questionnaire documented student opinion of the 10 different medical specialities taught to Oxford undergraduates: cardiology, dermatology, endocrinology, gastroenterology, geratology, haematology, neurology, renal medicine, respiratory medicine and rheumatology. To maximise objectivity and neutrality, at this stage in the questionnaire respondents were unaware that its focus was haematology. They were asked to rate each speciality on a scale of 1–5 according to five different criteria: their depth of knowledge of the subject, the degree to which they found it (a) difficult and (b) interesting, and the extent to which they felt prepared to (a) diagnose and (b) manage and treat common problems in that area as a hospital FY1 doctor. Finally, they were asked to rank each speciality in order of preference from 1–10, according to their likelihood of specialising in that field. For each criterion, 1 was the lowest possible score and 5 (or 10) the highest. A mean score was calculated for all criteria across all specialities. Using Kruskal-Wallis tests, we compared the mean scores for haematology with those for all other

Table 1: Single best answer, multiple choice questions

Questions	Answer options	Correct answer	% correct
1. Which of the following blood groups would it be unsafe to transfuse to a man of blood group O Rhesus positive?	O Rh positive		77
	O Rh negative		
	A Rh positive	X	
2. A patient is admitted with a cerebral haemorrhage. He takes warfarin and the INR is 7.0. Other than stopping warfarin, the recommended treatment would be to give:	IV vitamin K		71
	Fresh frozen plasma		
	Prothrombin complex concentrate		
	Vitamin K and prothrombin complex concentrate	X	
3. In a patient on warfarin in whom there is no, or only minor bleeding, at what INR would you consider administering Vitamin K?	3		36
	5		
	7		
	8	X	
	10		
4. The following test result would confirm a diagnosis of iron deficiency:	A low serum iron		61
	Both a low serum iron and low transferrin		
	A low serum ferritin	X	
5. Pernicious anaemia would be diagnosed in a patient with a macrocytic anaemia if:	Both the serum B12 and the red cell folate are low		79
	The serum B12 is low and there is a positive test for intrinsic factor antibodies		
	The serum B12 is low and there is a positive test for endomysial antibodies	X	
	The serum B12 is normal and there is a positive test for parietal cell antibodies		
6. A diagnosis of polycythaemia rubra vera would be made in a patient with a raised haemoglobin concentration if:	The patient is also hypoxic		82
	A blood test for JAK-2 is positive	X	
	The patient is taking diuretics		
	The patient is a cigarette smoker		
7. Which of the following series of blood test results would best support a diagnosis of disseminated intravascular coagulation?	PT prolonged. APTT normal. D-Dimer normal. Platelet count normal. Fibrinogen normal		74
	PT normal. APTT prolonged. D-Dimer normal. Platelet count normal Fibrinogen normal		
	PT prolonged. APTT prolonged. Platelet count low. D-Dimer normal. Fibrinogen normal		
	PT prolonged. APTT prolonged. Platelet count low. D-Dimer elevated. Fibrinogen low	X	
8. You decide to transfuse a young, fit patient with no cardiovascular disease who has suffered acute blood loss. What haemoglobin level will you aim for?	5		7
	7	X	
	9		
	11		

specialities. We considered differences significant when p was less than 0.05.

The focus of Section 2 was haematology specifically. In order to assess students' baseline knowledge, we wrote a short number of multiple choice questions (MCQs) covering a range of clinically important issues such as ABO incompatibility, anticoagulation and transfusion in anaemia (Table 1). The aim was to generate a snapshot of competence: we considered the ability to answer these questions correctly as a minimum pre-requisite of any competent FY1 doctor, and hoped to observe close to 100% accuracy from the student cohort.

We also asked students 'very briefly, in just a few words' to write their understanding of four

commonly reported features of blood films: rouleux, leuco-erythroblastic features, polychromasia and aniso-poikilocytosis. All these free text answers were recorded verbatim and independently coded by two consultant haematologists as either 'correct' or 'incorrect'. We erred on the side of generosity, marking as correct any reasonable interpretation either of the appearance of the film (e.g. rouleux described as 'stacks of red blood cells') or of its potential diagnostic significance (e.g. rouleux described as 'raised ESR → ?myeloma').

Finally, we asked students to describe 'anything, good or bad' they considered it important for us to know about the teaching of haematology at Oxford. Again, all responses were documented

Table 2: Responses to Section 1 of the questionnaire from medical students immediately prior to commencement of FY1 (n = 89). Each specialty is rated on a scale of 1–5, with 1 the lowest possible score and 5 the highest

	Cardio	Derm	Endo	Gastro	Gerat	Haem	Neuro	Renal	Resp	Rheum
Do you feel well prepared to diagnose common problems in each of the medical specialties?	4.25	3.44	3.99	3.98	3.60	3.54	3.82	3.48	4.15	3.65
Do you feel well prepared to manage and treat common problems in each of the medical specialties?	4.10	3.66	3.71	3.81	3.60	3.31	4.00	3.46	4.13	3.49
How good do you consider your knowledge of each medical specialty to be?	3.71	2.88	3.43	3.47	3.24	3.21	3.42	3.25	3.69	3.25
How difficult do you consider each of the medical specialties to be?	3.56	2.98	3.45	3.16	3.10	3.90	4.10	4.13	3.10	3.18
How interesting do you find each of the medical specialties?	3.97	2.71	4.07	3.36	2.62	3.74	4.25	3.62	3.49	3.17

Cardio, cardiology; Derm, dermatology; Endo, endocrinology; Gastro, gastroenterology; Gerat, geratology; Haem, haematology; Neuro, neurology; Renal, renal medicine; Resp, respiratory medicine; Rheum, rheumatology

verbatim, then coded thematically according to categories such as ‘more clinical haematology teaching requested’.

The questionnaire was distributed to nearly the entire cohort of final year students (140 of 160 students) at the start of a lecture, and collected at its end. Data from all distributed questionnaires, even if only partially completed (n = 2), were collected, analysed and included in the study.

**Results: difficult but popular**

Eighty-nine students completed the questionnaire, a response rate of 64%. Of all the medical specialities taught at Oxford, students felt least confident about managing and treating common problems in haematology (Table 2). The subject was regarded as the third most difficult branch of medicine, after neurology and renal medicine (Table 2). Relative to the other medical specialities, haematology also scored poorly in terms of how students rated their knowledge, coming seventh out of 10 (Table 2).

Despite this, haematology ranked as the fourth most popular potential medical career path after cardiology (first), neurology (second) and endocrinology (third) (Figure 1). It was also considered the fourth most interesting speciality (Table 2). All results were statistically significant (p < 0.05).

Contrary to our expectations, students’ performance in the haematology MCQs ranged from 92% accuracy in the best answered question (on polycythaemia rubra vera) to only 8% accuracy in the worst (on transfusion in anaemia) (Table 1). Across all the MCQs, students attained an average score of 68.4% accuracy.

Regarding blood film terminology, the best-described morphological term (‘rouleaux’) was interpreted correctly by 69% of the cohort. Forty-nine per cent of students appropriately described ‘leuco-erythroblastic features’ and

49% and 45 % appropriately described ‘polychromasia’ and ‘aniso-poikilocytosis’ respectively.

Fifty-two per cent of students chose to respond to our request for feedback, positive or negative, regarding the haematology teaching they had received. The majority of comments, just over three-quarters, fell into three broad categories: appeals for greater availability of the clinical haematology SSM (30%), more clinical haematology teaching (17%) and more haematology teaching in general (28%). Sample responses include:

“Very good teaching if you happen to have a placement on haematology but not everyone does.”

“There should be more teaching. Haematology is very difficult to learn in isolation without clinical exposure. At least a few clinics please.”

“There was so little teaching, it’s difficult to comment. Much more teaching is required – I clearly don’t understand haematology very well!”

The remaining comments were coded as ‘positive’ (n = 6), ‘negative’ (n = 1) and ‘miscellaneous’ (n = 2).

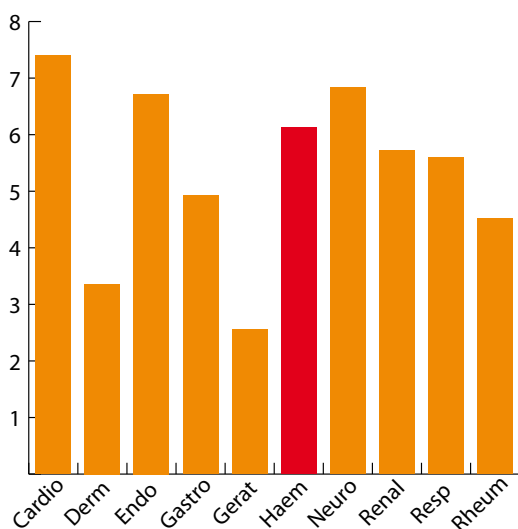
**Discussion: addressing haematophobia**

For haematologists, concerns about medical student teaching are perennial. Half a century ago, for example, American authors lamented the impossibility of teaching the ever-increasing amounts of knowledge in the field, given ever-decreasing amounts of teaching time.<sup>2</sup> Then, they were allocated around 70 hours to teach haematology – over double the median number received by American students today.<sup>3</sup>

Today, in Oxford, students receive a total of only 21 hours of core preclinical and clinical teaching in haematology, unless they either choose or are allocated the additional 2-week SSM in clinical haematology. Nationally, the disappearance of pathology, haematology included, from the undergraduate medical curriculum has been identified as a key concern.<sup>4</sup> It has been argued that if junior doctors lack sufficient basic training confidently to request and interpret laboratory tests, patient safety may be compromised. In addition, there may be detrimental knock-on effects on recruitment. Next year, for example, the worst case projected shortfall in consultant haematology posts in the UK is 241: 30% of the total number.<sup>4</sup> With this in mind, in 2005 the Royal College of Pathologists and the Pathological Society set up a working party to develop a national core curriculum in pathology.

In our study, these concerns appear at least partly justified. Haematophobia is evident in the particular lack of confidence felt by final year students on the brink of managing common blood disorders for the first time. Students also regard haematology as a particularly difficult medical speciality. More optimistically,

Figure 1: Medical specialties ranked in order of preference as potential career options (n = 87). 1 is the lowest possible score and 10 is the highest.



our data suggest that difficulty alone is not a deterrent to appeal. Haematology is regarded as being both above averagely interesting and above averagely attractive as a career option. It seems unlikely then that suboptimal recruitment levels into postgraduate haematology can be attributed to problems with undergraduate teaching alone.

Less positively, our attempt objectively to sample, through MCQs, student competence in haematology highlights what we consider to be significant gaps in knowledge. The obvious weakness in this part of our survey is its partial subjectivity: we both wrote the questions and decided the criteria with which to mark them. Furthermore, in several questions (e.g. that on the optimal target haemoglobin in a patient suffering acute blood loss), the evidence base is not robust and the national guidelines are somewhat ambiguous. Nonetheless, it is troubling that a month before starting FY1, significant proportions of new doctors apparently struggle with ABO blood group compatibilities, the appropriate management of haemorrhage in a patient on warfarin, and the laboratory diagnosis of disseminated intravascular coagulation – particularly since the British Committee for Standards in Haematology provides detailed guidance in all these areas.<sup>5</sup>

Students' relatively poor performance in interpreting blood film reports is also disquieting, given its potential impact on patient safety. The 2007 Foundation Programme Curriculum considers the ability competently to interpret results of common blood tests an essential skill for FY1 doctors.<sup>6</sup> Although today's blood films are frequently reported with the potential clinical significance of the morphology made clear, this is not always the case. So either undergraduate teaching needs to address this lacuna in knowledge or – more controversially perhaps – the language in which haematologists describe blood films needs to be democratised, replacing the likes of 'aniso-poikilocytosis' with more inclusive, less arcane (and, frankly, less Greek) terms such as 'abnormally shaped and sized cells'. After all, we teach undergraduate haematology primarily to produce doctors with an adequate understanding of the implications of blood disorders for all branches of medicine. Haematological jargon, no matter how useful for communicating with precision within the speciality, should never compromise this.

Students' relative lack of both confidence and competence in managing blood disorders mandates further research into why, from a student perspective, haematology is perceived as being particularly difficult to learn. The drafting of a national curriculum in haematology will only be successful in driving up standards

if course content, as distinct from its modes of delivery, is the key concern. That cannot be known for sure without more detailed survey of student opinion. Our data suggest, for example, that the simplest way to improve teaching (and therefore competence) in haematology might simply be to provide more of it. The overwhelming message from final year students at our institution was the plea – from over 75% of the cohort – for greater quantities of teaching. Most emphatically, students craved more hands-on experience of clinical haematology. In the words of one student:

*“Haematology teaching is good in theory – taught during the pathology course – but conditions are rarely seen during medical school. This prevents a deep understanding of the subject or inspiring greater interest.”*

Yet even in a tertiary referral centre, where numbers of medical students still vastly outnumber those of haematology inpatients, the logistics of providing meaningful clinical contact to the entire student cohort are challenging. Furthermore, a medical school curriculum as a whole cannot function practically by increasing the amount of time devoted to every subject in which students feel they might ideally like more instruction.

One solution might be the greater use of 'expert patients' who visit the hospital to lead discussions with groups of students about their condition, an initiative which in our experience students view very positively. A broader point, we suggest, is the need for haematologists actively to collaborate towards the end of optimising how, not only what, haematology is taught to undergraduates. In 2006, The Association of British Neurologists, grappling with neurophobia in students and doctors, researched and published national guidance on the best mechanisms through which to learn about disorders of the nervous system.<sup>7</sup> In tandem with the development of a national curriculum in haematology, perhaps haematologists should do the same?

#### **Acknowledgements**

We are very grateful to Dr Chris Bunch for co-marking the morphology component of the questionnaire, and to Dr Tim Lancaster and Dr Graham Collins for their helpful comments on the manuscript.

**Dr Rachel Clarke**  
John Radcliffe Hospital  
Oxford

**Dr Tim Littlewood**  
Cancer and Haematology Centre  
Churchill Hospital, Oxford

## References

1. Risdale L, Massey R, Clark L. Preventing neurophobia in medical students, and so future doctors. *Practical Neurol* 2007;7:116–123.
2. Harri JW, Horrigan DL, Ginther JR, Hale Ham T. Pilot study in teaching hematology with emphasis on self-education by the students. *J Med Educat* 1962;37:719–736.
3. Broudy V, Hickman S. Teaching hematology to second year medical students: results of a national survey of hematology course directors. *Ann Hematol* 2007;86:283–287.
4. Royal College of Pathologists. *The Pathologist in the 21st Century*, 2009. [www.rcpath.org/resources/pdf/ARo6\\_Adrian\\_Newland.pdf](http://www.rcpath.org/resources/pdf/ARo6_Adrian_Newland.pdf) (accessed 26/09/09).
5. British Society for Haematology. Committee for Standards in Haematology guidelines homepage, 2009. [www.bcshguidelines.com](http://www.bcshguidelines.com) (accessed 04/08/09).
6. Foundation Programme. *The Foundation Programme Curriculum*, 2007. [www.foundationprogramme.nhs.uk/pages/home/key-documents#foundation-programme-curriculum](http://www.foundationprogramme.nhs.uk/pages/home/key-documents#foundation-programme-curriculum) (accessed 04/08/09).
7. Association of British Neurologists. *Learning about Disorders of the Nervous System. Recommendations for UK Medical Undergraduate Education*, 2006. [www.theabn.org/downloads/disorders-of-nervous-system.pdf](http://www.theabn.org/downloads/disorders-of-nervous-system.pdf) (accessed 04/08/09).



Kari Nightingale

## Research project in pathology – a student perspective

Year 4 at Southampton medical school kicks off and elective and research projects are in store, a pleasant diversion after a year of clinical rotations. So first I suffer a 2-month clinical elective in Bermuda, and then I return to do 6 months' research in the far more glamorous surroundings of the mortuary at Southampton General Hospital (SGH). Something like that anyway.

As a mature student with a legal background and an interest in pathology, I must admit that my supervisors came up with the perfect project for me. With the likely consequence of the Coroners and Justice Bill being a reduction in the number of autopsies performed, we agreed that I would measure the rate of post mortem discrepancies in SGH in order to assess the potential impact of the proposed legislation. Encouragingly from the point of view of my student analysis skills, if not the likely effects of the Bill, my results were largely in line with the well-known study by Goldman *et al*<sup>1</sup> and a similar study previously conducted within the local trust.<sup>2</sup> In 25% of autopsies there are still major discrepancies. These are diagnoses which, had they been suspected during the patient's life, may have altered treatment or prolonged survival. Infection and pulmonary embolus continue to feature among the most frequently missed diagnoses. Overall, my findings indicated that the value of post mortem examination is undiminished despite modern diagnostics and intensive care techniques and that any further

reduction in autopsy rate is not supported and may even be detrimental to patient care.

### Why choose a research project in pathology?

In the academic years of my degree, the pathology lectures and tutorials were always among the best. They were delivered by doctors enthusiastic about their specialty but capable of avoiding the esoteric and as such they pitched the teaching at the right level. I suspected that the department might be a pleasant environment to work in and I was right. There is a welcome lack of the inflated hierarchy prevalent in some other fields of medicine and a genuine keenness to teach. I also thought a project would be a good opportunity to get a taster of pathology as a potential career since after qualification there will be little chance to spend any time in the specialty.

The research itself was of course not without its difficulties. In order to obtain sufficient data for the results to be meaningful, I needed to consider autopsies and the corresponding clinical notes spanning a period of a year but I only had a 6-month period in which to perform the research. There was no problem accessing the clinical notes for autopsies performed contemporaneously with my study, but for those considered retrospectively, locating the errant few sets of notes required tenacity and a disproportionate amount of time. However, while this could be frustrating, I wanted to ensure that my results were not skewed by default exclusion of a 'note-