

BMJ Open Clinician-scientist MB/PhD training in the UK: a nationwide survey of medical school policy

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ABSTRACT

Objective: This study surveyed all UK medical schools regarding their Bachelor of Medicine (MB), Doctor of Philosophy (PhD) (MB/PhD) training policy in order to map the current training landscape and to provide evidence for further research and policy development.

Setting: Deans of all UK medical schools registered with the Medical Schools Council were invited to participate in this survey electronically.

Primary: The number of medical schools that operate institutional MB/PhD programmes or permit self-directed student PhD intercalation.

Secondary: Medical school recruitment procedures and attitudes to policy guidance.

Findings: 27 of 33 (81%) registered UK medical schools responded. Four (14%) offer an institutional MB/PhD programme. However, of those without institutional programmes, 17 (73%) permit study interruption and PhD intercalation: two do not (one of whom had discontinued their programme in 2013), three were unsure and one failed to answer the question. Regarding student eligibility, respondents cited high academic achievement in medical studies and a bachelor's or master's degree. Of the Medical schools without institutional MB/PhD programmes, 5 (21%) have intentions to establish a programme, 8 (34%) do not and 3 were unsure, seven did not answer. 19 medical schools (70%) considered national guidelines are needed for future MB/PhD programme development.

Conclusions: We report the first national survey of MB/PhD training in the UK. Four medical schools have operational institutional MB/PhD programmes, with a further five intending to establish one. Most medical schools permit study interruption and PhD intercalation. The total number MB/PhD students yet to graduate from medical school could exceed 150, with 30 graduating per year. A majority of medical school respondents to this survey believe national guidelines are required for MB/PhD programme development and implementation. Further research should focus on the MB/PhD student experience. Discussion regarding local and national MB/PhD policies between medical schools and academic stakeholders are needed.

INTRODUCTION

Scientific advances translated from 'bench-to-bedside' drive improvements in

Strengths and limitations of this study

- This study is the first nationwide survey of medical schools regarding MB/PhD training.
- The method employed is a simple survey providing detailed data to a range of questions.
- This survey does not permit a detailed subjective discussion concerning finer considerations of MB/PhD policy.

clinical medicine.¹ Clinical academics play important roles in this process.^{1 2} For those in the UK wishing to pursue academic medicine after graduation, the well-established National Institute for Health Research (NIHR) integrated academic training programme offers candidates a programme of academic training alongside clinical practice. This starts with the academic foundation programme offering ~15% protected research time over 2 years; progressing to academic clinical fellowships (ACF) with ~25% protected research time.³ At the end of each stage (more commonly the latter), trainees may apply for doctoral training part-time or full-time. While this is a common route for undertaking a PhD after medical school, many candidates not on the NIHR programme also conduct doctoral research. Yet despite these opportunities, the UK academic medical clinical community remains burdened by regional variations and a lack of clinical academics in certain vulnerable specialities including occupational or emergency medicine;⁴ with only 6% of National Health Service (NHS) consultants reportedly conducting research as well as clinical practice.⁵

Though clinical engagement with scientific research commonly occurs after medical school graduation, individuals considering such opportunities can face several barriers.⁵ These include concerns in the procedural specialities about taking time out of clinical activity to conduct research, and the deleterious impact this might have on maintaining

their clinical or operative skill sets; the challenge of managing continuing clinical commitments alongside research, and the lure of an uninterrupted 'run-through' training in selected specialities.⁶ For medical students, almost all medical schools now offer intercalated Bachelors and Master's courses. These provide opportunities for 1-year study periods in clinical or scientific areas, including research projects and are well discussed elsewhere.⁷⁻¹⁰

The Bachelor of Medicine (MB), Doctor of Philosophy (PhD) (MB/PhD) route whereby medical students undertake a period of sustained research training culminating in a PhD part-way through their undergraduate medical training, is an alternative pathway to the NIHR based academic clinical medicine route as described earlier. MB/PhD programmes have been developed to offer an early career stage opportunity to develop research skills in science and medicine, with an expectation that such candidates will go on to be long-serving 'clinician-scientists'. Such programmes have existed in the UK and overseas for decades, but remain all but absent from current policy discourse.^{1 11 12}

UK MB/PhD programmes

Two long established MB/PhD programmes exist in the UK, based at the University of Cambridge and University College London.^{11 12} Established in 1989 and 1994, respectively, these programmes have offered prospective clinician-scientists the opportunity to undertake training in scientific research for a PhD during their undergraduate medical studies. In the UK, MB/PhD students typically embark on this PhD after completing an intercalated Bachelor's degree (iBSc). These programmes recently reported a retrospective follow-up of graduate outcomes. At the Cambridge MB/PhD programme, most students completed their PhD within 3.5 years, with 90% of the 80 respondents reporting a beneficial effect of the programme on their careers and 79% still in active research long after medical graduation.¹¹ University College London surveyed all enrolled (past and present) MB/PhD students (n=107), 56% of students had graduated with an MB/PhD, 28% were still completing their PhD and 11% were post-PhD completing their final medical studies; 4% of students had dropped out of the PhD component and had graduated only with a medical degree. Of those that had graduated, 27 (45%) of graduates were in a defined clinical academic track (academic foundation, post-doctoral scientist/fellow, lecturer or professor). UCL MB/PhD students had contributed substantial outputs in peer-reviewed publications.¹²

International MD/PhD programmes

Several countries have established MD/PhD programmes at their medical institutions, including the USA,¹³⁻¹⁵ Germany,¹⁶ Switzerland,¹⁷ Australia¹⁸ and Singapore.¹⁹ Candidates may undergo rigorous selection early in their medical education before completing their

preclinical studies, and in some cases parts of their clinical training. For example, in the USA, there are over 70 MD/PhD programmes offered by US medical schools to aspiring clinician-scientists.²⁰ Reports concerning graduates of these programmes suggest the majority of candidates achieve a high-level of onward engagement in clinical academia, research and industry.²⁰⁻²² For example, a study of 5969 MD-PhD trainees in the US found 81% were in academia (82% of whom were conducting research), research institutes or industry.²² Another study from the US found MD/PhD graduates constituted 2.3% of all medical graduates and had higher planned career involvement in research.²⁰ However, reports from Australia²³ and the US²⁰ point to the difficulties encountered in sustaining MD/PhD training including student intake and retention.

UK academic medicine and MB/PhD landscape

As a result of the restructuring and consolidation of medical education in the UK, most medical schools are now affiliated with well-established medical and scientific institutes or Universities. Latest data suggest of these 33 medical schools, at least 27 are experiencing local or national recruitment challenges for clinical academics;⁴ in the same report it cited that 'sustaining the pipeline of the clinical academic workforce is pivotal to ensuring continued excellence in patient care'. Yet, despite calls in the UK for a redoubling of efforts regarding academic medical training over the last decade^{6 24-27} discussion on the number of institutional MB/PhD programmes in operation or the role they could play remains limited.^{25 28} To our knowledge, only two medical schools have long-running institutional programmes with their graduate outcomes published. Several other medical schools have operated MB/PhD programmes at certain points over the last decade but without reporting of their institutional and student experience or outcomes.

The last policy debate on UK MB/PhD training took place at the Academy of Medical Sciences in 2007.²⁹ Accordingly, to understand the state of the MB/PhD training nationally, and to inform postgraduate education, academic and research policy, we conducted the first reported survey of all 33 Registered UK medical schools. The aim of this study was to identify the MB/PhD opportunities available in the UK and to better understand the challenges and needs of medical schools regarding future MB/PhD training. This article reports the findings from this survey and discusses the policy implications for MB/PhD training in the UK.

METHODS

Participant selection

All medical schools fully registered with the Medical Schools Council in January 2015 (n=33) were selected to take part in this survey. Deans were contacted by email and invited to participate. Deans received a single follow-up reminder over the 10 week study period.

Survey administration

Using an online questionnaire (surveymonkey) (see online supplementary appendix S1) deans were asked: whether institutional MB/PhD programmes existed; if medical students are permitted to interrupt and intercalate a PhD in the absence of an institutional programme; whether the given school intended to start a MB/PhD programme and perceived barriers to development.

Data analysis

Data were collected online, analysed and tabulated.

Results

Institutional programmes and self-directed intercalation

As shown in [table 1](#), 27 of 33 (81%) registered UK medical schools responded. All medical schools offered an intercalated bachelor's or master's degree (data not shown). Of respondents, four medical schools (14%) have an operational institutional MB/PhD programme ([figure 1](#)), and a further two medical schools had discontinued an MB/PhD programme in the past 5 years. Of those without

institutional programmes, 17 (73%) permit study interruption and PhD intercalation, two do not (one of whom had discontinued their programme in 2013), three were unsure and one did not answer. Two medical schools with formal programmes; Cambridge and University College London have been running their programmes for over 20 years; Imperial College London and Manchester have been running their programmes for less than 10 years, the former enrolling on average six students per annum, the latter 1–2 per annum. Regarding medical schools without institutional programmes, on average 1–2 students were permitted to intercalate a PhD annually; which varied between full-time and part-time research depending on the medical school.

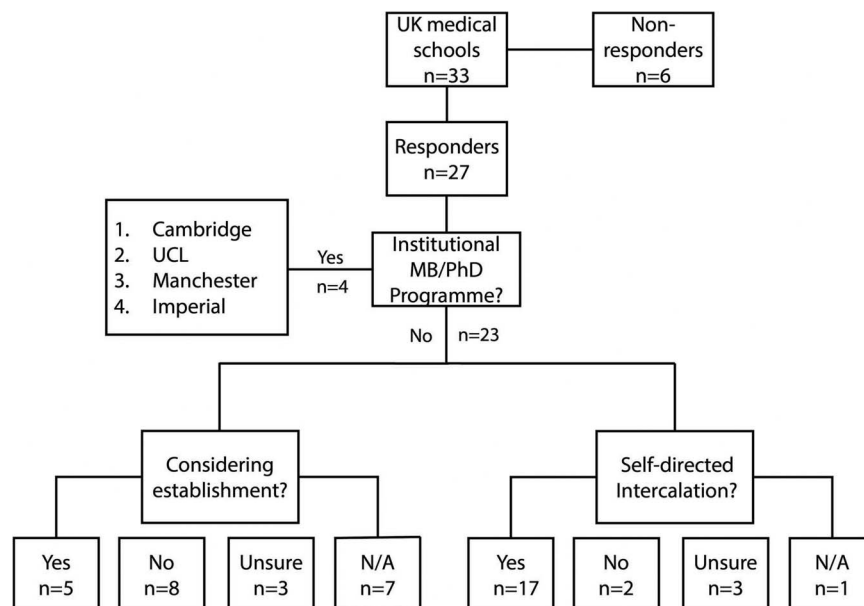
Student eligibility and recruitment

Regarding student eligibility, respondents with institutional programmes expected candidates to: hold a 2:1 or first class intercalated bachelor's or master's degree, demonstrate high academic attainment on paper and in interview. Regarding respondents who permit self-

Table 1 UK medical schools and study respondents

	Medical School (n=33)	Respondents (n=27)
1	Aberdeen (University of), School of Medicine	Y
2	Barts and The London School of Medicine and Dentistry, Queen Mary, University of London	Y
3	Birmingham (University of), School of Medicine	
4	Brighton and Sussex Medical School	Y
5	Bristol (University of), Faculty of Medicine	Y
6	Cambridge (University of), School of Clinical Medicine	Y
7	Cardiff University, School of Medicine	Y
8	Dundee (University of), Faculty of Medicine, Dentistry and Nursing	Y
9	Edinburgh (The University of), College of Medicine and Veterinary Medicine	Y
10	Exeter (University of), Medical School	
11	Glasgow (University of), College of Medical, Veterinary and Life Sciences	Y
12	Hull York Medical School	
13	Imperial College School of Medicine, London	Y
14	Keele University, School of Medicine	Y
15	King's College London School of Medicine (at Guy's, King's College and St Thomas' Hospital)	
16	Lancaster University, Faculty of Health & Medicine	Y
17	Leeds (University of), School of Medicine	
18	Leicester (University of), Leicester Medical School	Y
19	Liverpool (University of), Faculty of Health and Life Sciences	Y
20	Manchester (University of), Faculty of Medical and Human Sciences	Y
21	Newcastle University Medical School	Y
22	Norwich Medical School, University of East Anglia	Y
23	Nottingham (The University of), Faculty of Medicine and Health Sciences	Y
24	Oxford (University of), Medical Sciences Division	Y
25	Plymouth University Peninsula Schools of Medicine and Dentistry	Y
26	Queen's University Belfast, Faculty of Medicine and Health Sciences	Y
27	Sheffield (The University of), School of Medicine	Y
28	Southampton (University of), School of Medicine	Y
29	St Andrews (University of), Faculty of Medical Sciences	Y
30	St George's, University of London	Y
31	Swansea University, School of Medicine	Y
32	University College London, University College Medical School	Y
33	Warwick (The University of), Warwick Medical School	

Figure 1 Flow diagram of study findings. N/A, no answer.



directed PhD intercalation, 9 (53%) medical schools expected candidates to have completed at least 3 years of medical school and achieved highly in their academic studies and at interview. Six (35%) provided no details on student eligibility, one medical school did not know their requirements and another had none.

Regarding student recruitment, institutional programmes advertised their opportunities widely to candidates including: posting on institutional websites (4, 100%), emails to student lists (3, 75%) and personal invites to exceptional candidates (2, 50%). Two of the four medical schools with institutional programmes had MB/PhD student representatives to communicate student issues to faculty. Regarding respondents who permit self-directed PhD intercalation, 8 (72%) only advertised through personal invitations to candidates; 3 (17%) used posting of opportunities on institutional websites; 3 (17%) did not provide details on how they advertised their opportunities to students, and 3 (17%) did not advertise opportunities.

Medical school policy intentions and perspectives on national guidance

Finally, medical schools were invited to describe their future policy intentions regarding MB/PhD training. Of the medical school participants without institutional MB/PhD programmes, 5 (21%) hold intentions to establish a programme, 8 (34%) do not, 3 (13%) were unsure and 7 (30%) did not answer. Among respondents who did not intend to establish a programme frequent reasons cited were: unconvinced of student benefit (5, 63%), funding constraints (4, 50%), unconvinced of student interest (3, 38%) or institutional benefit (3, 38%).

All medical school participants were asked whether they considered national guidelines were needed to inform development of MB/PhD programmes.

Nineteen medical schools (70%) felt they were needed, 4 (14%) did not and 4 (14%) were unsure. Common reasons cited in favour of guideline establishment included the sharing of best practice and evidence, and the opportunity for programme standardisation. Respondents felt such guidance should also cover strategic considerations such as advice on funding options and methods to facilitate continued clinical contact during PhD research.

DISCUSSION

We report the first nationwide survey of MB/PhD training in the UK. In this study 27 medical schools participated; 4 had institutional MB/PhD programmes in operation and a further 5 were considering programme establishment. Eight medical schools did not have plans to establish a programme and three were unsure. Nineteen medical schools felt guidance was needed for programme establishment and development. An estimate from data provided in this study suggests from a total MB/PhD cohort of approximately 150 students yet to graduate from medical school, around 30 candidates embark on or complete an MB/PhD (institutional or self-directed) annually; giving a prevalence of 0.5% of all medical graduates,^{30 31} compared to the USA where 2.3% of medical graduates possess an MD/PhD.²⁰ Approximately 250 NIHR ACFs are offered annually, however, not all of these candidates will immediately go on to doctoral research.³ The MB/PhD cohort in the UK therefore represents a sizeable portion of the in-training UK academic medical community.

National MB/PhD opportunities

In this study, four medical school respondents confirmed offering medical students opportunities on an institutional MB/PhD programme. However, a further 17 permit their medical students to undertake a PhD

through interruption of studies and intercalation. While both options enable medical students to undertake a PhD and gain scientific research training, the self-directed intercalation route may not afford students the same opportunities for continued clinical teaching, exposure and mentorship compared to programmes organised by institutions.^{12–28} This is particularly significant given the potential negative effects of sustained research time periods on subsequent medical student academic attainment.³² It would be prudent in further studies to investigate the size and experiences of this self-directed intercalation cohort, for whom no current data exist.

Student recruitment

In this study, we found unsurprisingly that high-academic achievement and a bachelor's or master's degree was a pre-requisite for enrolment on an institutional MB/PhD programme. However, details on the method by which candidates seeking to self-intercalate their PhD find and apply to laboratories and departments remains unclear. Our findings that 72% of medical schools (that provided details) invite candidates personally to intercalate a PhD, with only 27% of medical schools using institution-wide advertisement could hold implications for the perceived fairness and accessibility of MB/PhD opportunities; a topic of robust debate in the USA.²⁰

MB/PhD programme experience and best practice

Frequent reasons cited by medical school respondents of this survey for choosing not to consider establishing an MB/PhD programme included: being unconvinced of student or institutional benefit, and funding constraints. Notwithstanding the encouraging evidence reported by the Universities of Cambridge and University College London;^{11–12} or the international evidence to suggest such programmes can be of substantial benefit to institutions both in terms of academic publications, graduate appointments and positive feedback and prestige;^{11–12–15–21} building an evidence base of the institutional value will require engagement with all four institutions currently operating programmes, and the Universities of Nottingham and Leicester who recently discontinued MB/PhD programmes, to gather lessons learned and institutional experience.

Policy implications

Discussions surrounding UK MB/PhD policy last took place in 2007 under the auspices of the Academy of Medical Sciences.²⁹ These concluded with a series of recommendations, including for: a renewed consideration to 'establish a nationwide resource with sustained funding', increased 'linkages' between institutional programmes and nationwide mentoring. However, in the absence of a formal stakeholder tasked with implementation, these recommendations appear to have stalled. This view is supported by our finding that 70% of medical school respondents felt national guidelines are

needed for establishment and development of institutional MB/PhD programmes. With five medical schools already committed to establishing such a programme, policy deliberations on this matter should occur with urgency. Funding constraints were cited as a key reason limiting institutions from establishing MB/PhD programmes; however, major research charities including the British Heart Foundation and Wellcome Trust now offer studentships and postdoctoral fellowships, respectively, for MB/PhD students. Interest is also strong in the pharmaceutical and biotechnological sectors.²⁹

This study does not focus on the student experience of candidates; a necessary component for onward policy discussion. Engagement should occur in future work with both those on institutional programmes and undertaking self-directed intercalations. This could be facilitated through a national student body for MB/PhD students in the UK to consolidate student experiences, gather evidence and contribute to regional and national debate. Examples of such bodies and their efficacy can be seen internationally including: the long-established American Physician Scientists Association,³³ Swiss MD-PhD Association³⁴ and the expanding European MD-PhD Association.³⁵

CONCLUSIONS

We report the first nationwide survey of MB/PhD training in the UK: four medical schools offer institutional MB/PhD programmes, a further five are in the process of establishment. The total number MB/PhD students yet to graduate from medical school could exceed 150, with a sizeable proportion conducting self-directed PhD intercalations. Selection criteria and recruitment of candidates differ between medical schools; the majority of whom feel further guidance is needed to inform local MB/PhD policies regarding student engagement, support and funding.

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REFERENCES

- [No authors listed]. Translational research and experimental medicine in 2012. *Lancet* 2012;379:1.

2. Tooke J, Wass J, Horton R. Shaping academic medicine. *Lancet* 2014;383(Suppl 1):S1–2.
3. NIHR Integrated Academic Training Programme for Doctors and Dentists. 2015. <http://www.nihr.ac.uk/funding/integrated-academic-training-programme.htm> (accessed 10/5/2015).
4. Fitzpatrick S. *A survey of staffing levels of medical clinical academics in UK medical schools as at 31 July 2014*. Medical Schools Council, London; 2015.
5. Fitzpatrick S. *Challenges and opportunities for recruitment to clinical academic medicine and dentistry - an article for London Medicine*. Medical Schools Council, Dental Schools Council, London; 2011.
6. Royal College of Physicians. *Clinical academic medicine: the way forward. Report from the Forum on Academic Medicine*. London: RCP, 2004.
7. Jones M, Hutt P, Eastwood S, *et al*. Impact of an intercalated BSc on medical student performance and careers: a BEME systematic review: BEME Guide No. 28. *Med Teach* 2013;35:e1493–510.
8. Leung W. Is studying for an intercalated degree a wise career move?. *Student BMJ* 2001;09:399–442.
9. Barnett-Vanes A, Shalhoub J. Studying for an intercalated BSc externally. *Student BMJ* 2014;22:g2194.
10. Gardner K, Olojugba C. Should I do an intercalated BSc? *Student BMJ* 2008;16:238–239.
11. Cox TM, Brimicombe J, Wood DF, *et al*. The Cambridge bachelor of Medicine (MB)/Doctor of Philosophy (PhD): graduate outcomes of the first MB/PhD programme in the UK. *Clin Med* 2012;12:530–4.
12. Stewart GW. An MBPhD programme in the UK: the UCL experience. *Clin Med* 2012;12:526–9.
13. Chien KR. Regenerating physician-scientists. *Nat Med* 2010;16:511.
14. Watt CD, Greeley SA, Shea JA, *et al*. Educational views and attitudes, and career goals of MD-PhD students at the University of Pennsylvania School of Medicine. *Acad Med* 2005;80:193–8.
15. Jeffe DB, Andriole DA, Wathington HD, *et al*. Educational outcomes for students enrolled in MD-PhD programs at medical school matriculation, 1995–2000: a national cohort study. *Acad Med* 2014;89:84–93.
16. Bosse D, Milger K, Morty RE. Clinician-scientist trainee: a German perspective. *Clin Invest Med* 2011;34:E324.
17. Kuehnle K, Winkler DT, Meier-Abt PJ. Swiss national MD-PhD-program: an outcome analysis. *Swiss Med Wkly* 2009;139:540–6.
18. Power BD, White AJ, Sefton AJ. Research within a medical degree: the combined MB BS-PhD program at the University of Sydney. *Med J Aust* 2003;179:614–16.
19. Hooi SC, Koh DR, Chow VT. The NUS MBBS-PhD programme: nurturing clinician-scientists for tomorrow. *Ann Acad Med Singapore* 2005;34:163C–5C.
20. Andriole DA, Whelan AJ, Jeffe DB. Characteristics and career intentions of the emerging MD/PhD workforce. *JAMA* 2008;300:1165–73.
21. Bonham AC. MD-PhD training: looking back and looking forward. *Acad Med* 2014;89:21–3.
22. Brass LF, Akabas MH, Burnley LD, *et al*. Are MD-PhD programs meeting their goals? an analysis of career choices made by graduates of 24 MD-PhD programs. *Acad Med* 2010;85:692–701.
23. Kandiah D. Sustainability of MBPhD programmes. *Clin Med* 2013;13:214.
24. Walport M. *Medically- and dentally-qualified academic staff: recommendations for training the researchers and educators of the future*. London: Report of the Academic Careers Sub-Committee of Modernising Medical Careers and the UKCRC, 2005.
25. Irwin GW, Spence RA, McAuley DF, *et al*. Academic medicine—revolution, evolution or extinction? *Ulster Med J* 2014;83:141–5.
26. Academy of Medical Sciences. *Clinical academic in jeopardy: recommendations for change*. London: AMS, 2002.
27. Pusey C, Thakker R. Is there a future for academic medicine in the UK? *Br J Hosp Med* 2005;66:198–9.
28. Barnett-Vanes A, Lee M. MB/PhD training in the UK: towards embracement. *Med Educ* 2013;47:1048.
29. Academy of Medical Sciences. *MB PhD Programmes: A Position Paper by the Academy of Medical Sciences*. 2007. <https://www.acmedsci.ac.uk/viewFile/publicationDownloads/MBPhDPos.pdf>
30. Health at a Glance 2011: OECD Indicators. http://www.oecd-ilibrary.org/social-issues-migration-health/health-at-a-glance-2011_health_glance-2011-en (accessed 31 Aug 2011).
31. General Medical Council. *The state of medical education and practice in the UK*. 2012. <http://www.gmc-uk.org/publications/somep2012.asp>
32. Dyrbye LN, Thomas MR, Natt N, *et al*. Prolonged delays for research training in medical school are associated with poorer subsequent clinical knowledge. *J Gen Intern Med* 2007; 22:1101–6.
33. American Physician Scientists Association. 2014. <http://www.physicianscientists.org/>
34. The Swiss MD-PhD Association. <http://www.smpa.org/> (accessed 24 Nov 2014).
35. The European MD/PhD Network. www.eumdphd.com (accessed 24 Nov 2014).