

ORIGINAL ARTICLES

Scottish Anatomy Departments: Adapting to Change

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Objectives

To document changes to the academic infrastructure of Scottish departments of anatomy over the past 20 years and compare the strategic approaches adopted by each institution to ensure continued provision of the subject to medical students.

Design

Interviews with principal anatomy staff members to obtain targeted information (staff numbers, staff recruitment, student numbers, staff:student ratio and contact hours in the medical curriculum) by investigating three temporal snapshots chosen at 10 year intervals (academic years 1983/4, 1993/4 and 2003/4).

Participants

Principal teaching staff members from the anatomy departments at the five Scottish medical schools: University of Aberdeen, University of Dundee, University of Edinburgh, University of Glasgow and the University of St Andrews. Additional information was forthcoming from the admissions office of each University.

Results

Over the past 20 years the Scottish anatomy schools have weathered a variety of external and internal influences and each school has adopted very individual strategies to the delivery and maintenance of their subject. Some schools have unquestionably been more affected than others but all have responded in a unique way to the demands of the disciplines they choose to subserve. In general, each school has seen a decline in the compliment of teachers (staff + demonstrators) whereas the student number has increased dramatically. Each department has micromanaged its proportions of lectures, dissecting room practical time and tutorials to best fit their student base, staff capabilities and the requirements of, and/or alterations to, the medical curriculum offered in their institution.

Key Words

Anatomy, Scotland, medical curriculum, GMC, staff number, student number, contact hours.

Introduction

Over the past 20 years there has been a general perception held by Scottish anatomy staff members that the infrastructure of anatomy is in decline, a widespread situation that has also been identified by US anatomy schools. A study carried out by Collins *et al*¹ who surveyed the status of anatomy in the US and Canada suggested that anatomy commenced its decline in the early 1980s and described the future outlook for gross anatomy as “moribund”. Moreover an article in the Los Angeles Times² summarised the predicament facing anatomy in many medical schools throughout the US - “over the past two decades, the field has

lost prominence at medical schools – the victim of an overly packed curriculum, a shortage of teachers and a general sense that dissection is an antiquated chore in a high tech world”.

Following recommendations in the “Tomorrow’s Doctors” General Medical Council (1993) publication³, many of the medical teaching schools in Scotland were encouraged to essentially withdraw from the traditional approach to the undergraduate teaching of anatomy which was perceived as being too heavy on factual content and didactic teaching. Whilst the systems and problem based approaches to anatomy gained great favour with medical educationalists they have brought into serious question the relevance of existing student contact time and the quantity and quality of anatomy offered to students in the undergraduate medical curriculum⁴.

Doctors at the 2001 BMA junior members’ forum proposed that “anatomy must remain a fundamental part of the medical curriculum and not be crowded out by newer subjects on the curriculum”⁵ whilst Williams and Lau⁶ state that “educational reform is being driven by enthusiasm for change rather than by rational responses to the shortcomings of traditional curriculums” and that “a rigorous comparison of traditional versus “new” curriculums is urgently needed to determine the best strategy for training doctors”.

Documenting the series of changes that occurred within the infrastructure of anatomy at a national level over the past 20 years, Pryde and Black⁴ confirmed the largely anecdotal views that contact hours and staffing levels decreased substantially whilst undergraduate student numbers increased significantly between 1983/4 and 2003/4 with the greatest percentage of change happening in the second decade most likely due to implementation of the GMC recommendations. This current communication examines the changes that each anatomy school within Scotland has undergone over the past 20 years and compares the individual strategies adopted to maintain anatomical provision in the congested world of the modern medical curriculum.

Methods

The data for this study was collected from both the admissions offices and the principal teaching staff of the five Scottish

Table I Potential External Forces Acting on Scottish Anatomy Schools over the past 20 years - compiled from anecdotal evidence as proffered by anatomy staff

External Force	Effect
General Medical Council "Tomorrow's Doctors" Medical Workforce Standing Advisory Committee	Initiative to withdraw from the traditional approach to undergraduate teaching of anatomy which was perceived as being too heavy on factual content and didactic teaching. Recognised the deficiency in doctor numbers outlining a need for increased medical student intake.
Government initiative to achieve 50% of school leavers in higher education	Increased undergraduate student numbers across all subjects.
Revolutions in medical science	Sciences such as pharmacology, molecular biology and medical sociology have developed significantly over the past 20 years resulting in a more crowded curriculum where subjects must compete for contact time.
Down turn in academic salary	Reduction in the number of graduates entering academia as a result of salaries that have not kept pace with inflation.
Reduction in the number of academics capable of, or willing to, teach anatomy	Staff recruitment capability is low.

Anatomy Schools within the Universities that offer medical education. Current and retired staff members at the Universities of Aberdeen, Dundee, Edinburgh, Glasgow and St-Andrews were interviewed to provide the following information pertaining to each of the three temporal snapshots representing academic years 1983/4, 1993/4 and 2003/4:

Table II Potential Internal Forces Acting on Scottish Anatomy Schools over the past 20 years - compiled from anecdotal evidence as proffered by anatomy staff

Internal Force	Effect
Undergraduate Medical Education Committees and Medical Deans	In an attempt to implement the GMC "Tomorrow's Doctors" initiative, contact hours have been significantly reduced resulting in a change of status of the subject within the curriculum.
Research orientated recruitment	Traditional anatomists are generally not successful at competing for research funding. In an academic forum which is driven by grants and publishing, anatomy status has declined.
Loss of departmental status and professorial appointments	Most anatomy departments were incorporated into faculties and divisions, losing independence and therefore status.
Lack of career progression	Compared to research success, academic teaching posts offer little opportunity for career progression and promotion.

- The number and nature of teaching staff involved in anatomical instruction
- Undergraduate/postgraduate student intake per year and the degree pathway e.g. medicine, dentistry or science (but only pertaining to anatomical involvement)
- The teacher:student ratio was calculated from the previous data
- The total number of anatomy lecture, practical and tutorial hours offered to each medical student
- Many staff offered opinions on both the external and internal factors that may have brought some influence to bear on the alterations experienced by each of the departments (Tables I and II).

Results

Aberdeen (Table III)

Over a 20 year period Aberdeen has lost 50% of its full time teaching staff and 40% of its overall staffing compliment. As a consequence Aberdeen has the second smallest teaching base for anatomy in Scotland although it should be noted that all staff are either full time or part time teachers with no demonstrator or honorary staff positions. In 20 years, Aberdeen has seen its medical student intake rise by 41% and its science intake reduced by 27% resulting in an overall modest rise of 19% in student numbers. The reduction in science student number has helped to preserve the staff:student ratio as being the third best in Scotland at 1:38. Medical students have seen their contact hours with anatomy decrease by 58% mainly due to a 79.5% reduction in lecture hours and a 55% decrease in practical time, such that medical students no longer undertake dissection. Although small group teaching has increased by 45%, in reality this represents only a marginal increase from 11 to 16 hours in any one year. In the academic year of 2003/04 Aberdeen had no postgraduate students. Aberdeen did not fill its Regius Chair of anatomy in 1991 and has no personal professorial appointments.

Dundee (Table IV)

Over a 20 year period, Dundee has lost 33% of its full time teaching staff and 12% of its total staff. However it is unique in showing a small increase (9%) in its overall teaching complement, currently holding the largest number of teachers in this subject in Scotland (7 staff + 5 demonstrators). Much of this has occurred through an increase in clinical demonstrator posts with Dundee holding 5 out of the 7 posts remaining in Scotland. Medical student numbers have increased by 69% (the largest percentage increase in Scotland), dental students have increased by 44% and science students have increased by a factor of 31 from 3 students in 1983 to 92 students in 2003. Overall, Dundee's undergraduate student intake to anatomy has doubled over the past two decades making it the second largest anatomical education provider in Scotland. Dundee has retained a small number of postgraduate students (2). The teacher:student ratio is the second lowest in Scotland at 1:28. The total contact hours experienced by a medical student at Dundee has decreased by 68% with a 69% reduction occurring in lecture time, a 63% reduction in practical time and the abolition of tutorials. Medical students undertake full postcranial body dissection whilst the dental students undertake the head and neck dissection and science students undertake full body dissection. The school has 2 professorial appointments – a named chair (Cox) and a personal chair.

Edinburgh (Table V)

Over a 20 year period, Edinburgh has experienced a 67% loss in its teaching staff (the highest in Scotland) and retains no demonstrator posts. Edinburgh has the smallest teaching base of any school in Scotland (3 full time staff). Medical student numbers have increased by 52% (the second highest percentage increase in the country) resulting in Edinburgh having the largest complement of medical students in Scotland. A science programme that attracted 150 students in 1993 was abandoned

Table III Summary statistics for the Aberdeen anatomy school

Aberdeen	1983/4	1993/4	2003/4	%83-93	%93-03	%83-03
Full Time Staff	10	7	5	-30	-29	-50
Total Staff	10	9	6	-10	-33	-40
Demonstrators	0	0	0			
Medical Student Intake	130	138	183	6	33	41
Dental Student Intake	n/a	n/a	n/a			
Science Intake	60	25	44	-58	76	-27
Total Undergraduate Intake	190	163	227	-14	39	19
Teacher:Student Ratio	1:19	1:18	1:38			
Lecture Hours	83	83	17	0	-79.5	-79.5
Practical Hours	198	198	90	0	-55	-55
Tutorial Hours	11	11	16	0	45	45
Total Contact Hours	292	292	123	0	-58	-58
Total Postgraduate Intake	6	2	0	-67	-100	-100

Table IV Summary statistics for the Dundee anatomy school

Dundee	1983/4	1993/4	2003/4	%83-93	%93-03	%83-03
Full Time Staff	6	4	4	-33	0	-33
Total Staff	8	6	7	-25	17	-12
Demonstrators	3	4	5	33	25	67
Medical Student Intake	110	138	178	25	29	69
Dental Student Intake	43	52	62	21	19	44
Science Intake	3	62	92	X21	48	X31
Total Undergraduate Intake	156	252	332	62	32	X2
Teacher:Student Ratio	1:14	1:25	1:28			
Lecture Hours	153	81	48	-47	-41	-69
Practical Hours	258	136	96	-47	-29	-63
Tutorial Hours	36	25	0	-31	-100	-100
Total Contact Hours	447	242	144	-46	-40	-68
Total Postgraduate Intake	2	0	2	-100	100	0

Table V Summary statistics for the Edinburgh anatomy school

Edinburgh	1983/4	1993/4	2003/4	%83-93	%93-03	%83-03
Full Time Staff	9	9	3	0	-67	-67
Total Staff	9	9	3	0	-67	-67
Demonstrators	4	1	0	-75	-100	-100
Medical Student Intake	170	200	258	18	29	52
Dental Student Intake	n/a	n/a	n/a			
Science Intake	0	150	0		-100	0
Total Undergraduate Intake	170	350	258	106	-26	52
Teacher:Student Ratio	1:13	1:35	1:86			
Lecture Hours	218	41	17	-81	-58	-92
Practical Hours	227	100	50	-56	-50	-78
Tutorial Hours	0	0	0	0	0	0
Total Contact Hours	445	141	67	-68	-52	-85
Total Postgraduate Intake	0	8	1		-88	

Table VI Summary statistics for the Glasgow anatomy school

Glasgow	1983/4	1993/4	2003/4	%83-93	%93-03	%83-03
Full Time Staff	8	8	8	0	0	0
Total Staff	8	8	8	0	0	0
Demonstrators	14	9	2	-36	-78	-86
Medical Student Intake	210	210	240	0	14	14
Dental Student Intake	40	60	60	50	0	50
Science Intake	0	6	750		X125	
Total Undergraduate Intake	250	276	1050	10	X3	X4
Teacher:Student Ratio	1:11	1:16	1:105			
Lecture Hours	126	168	10	33	-94	-92
Practical Hours	266	264	124	-1	-53	-53
Tutorial Hours	7	0	94			X13
Total Contact Hours	399	432	228	8	-47	-43
Total Postgraduate Intake	3	3	6	0	100	100

by 2003 so that medical students are the only undergraduate degree under instruction in this anatomy school. The teacher:student ratio is the second highest in Scotland at 1:86. The total contact hours experienced by a medical student are the lowest in Scotland at 67 hours and have decreased by 85% from 445 hours in 1983 which was amongst the highest in the country. Lectures were reduced by 92%, practical time by 78% (to a total of 50 hours) which is the lowest in Scotland and tutorials are not undertaken. Medical students do not dissect. Edinburgh retained one postgraduate student in 2003 compared to 8 that were present in the department in 1993. Edinburgh has 1 personal professorial position.

Glasgow (Table VI)

Over the last two decades, Glasgow has retained both its full time and its part time staff complement although demonstrator numbers have reduced by 86% from 14 in 1983 to 2 in 2003. Medical student numbers have increased by a modest 14% in the last 20 years (lowest percentage increase in Scotland). In 1983 and 1993 Glasgow had the largest intake of medical students but this altered by 2003 so that Edinburgh now has the highest intake in Scotland. In the last 20 years dental students have increased by 50% and science intake has risen dramatically from zero in 1983 to 750 in 2003. This largest scientific intake for an anatomy department in Scotland has resulted in the highest teacher:student ratio in Scotland of 1:105. In any one year, the number of undergraduate students requiring anatomical instruction in Glasgow (1050) exceeds the total number of students attending anatomy classes in the rest of the country (942). Although medical students in Glasgow have seen a 43% reduction in contact time with anatomy (the second lowest in Scotland) they still offer 228 hours which is the largest contact time for medical students. This has been achieved through a 92% reduction in lecture time to only 10 hours, a 53% reduction in practical time and a thirteen fold increase in tutorial time to 94 hours in any academic year. Medical students undertake selective body dissection. Over the 20 years of this study, Glasgow has doubled its postgraduate student number from 3 to 6 individuals. Glasgow University did not replace its Regis Professorial chair in 1991 and retains one personal chair.

St Andrew's (Table VII)

St. Andrew's anatomy school has maintained its overall complement of teaching staff (although they are the only department in Scotland to utilise honorary staff) but all demonstrator posts have been lost. Medical student intake has risen by 32% in the last two decades and St. Andrew's has the smallest annual intake of medical students in Scotland (125). Science student instruction was discontinued by 1993, resulting in a teacher:student ratio that is the lowest in Scotland at 1:12. This is the only Scottish anatomy department to record a decline in total undergraduate number (7%) over the time period examined. St. Andrew's has reduced its contact time with medical students by 36% (lowest in Scotland over the last 20 years) and has achieved this through a 39% reduction in lectures (although they still offer the highest number of anatomy lectures in any Scottish anatomy school at 127 hours) and a 32% reduction in practical hours. Medical students undertake

Table VI Summary statistics for the Glasgow anatomy school

Glasgow	1983/4	1993/4	2003/4	%83-93	%93-03	%83-03
Full Time Staff	8	8	8	0	0	0
Total Staff	8	8	8	0	0	0
Demonstrators	14	9	2	-36	-78	-86
Medical Student Intake	210	210	240	0	14	14
Dental Student Intake	40	60	60	50	0	50
Science Intake	0	6	750		X125	
Total Undergraduate Intake	250	276	1050	10	X3	X4
Teacher:Student Ratio	1:11	1:16	1:105			
Lecture Hours	126	168	10	33	-94	-92
Practical Hours	266	264	124	-1	-53	-53
Tutorial Hours	7	0	94			X13
Total Contact Hours	399	432	228	8	-47	-43
Total Postgraduate Intake	3	3	6	0	100	100

Table VII Summary statistics for the St Andrew's anatomy school

St Andrews	1983/4	1993/4	2003/4	%83-93	%93-03	%83-03
Full Time Staff	6	6	6	0	0	0
Total Staff	10	9	10	-10	11	0
Demonstrators	3	3	0	0	-100	-100
Medical Student Intake	95	99	125	4	26	32
Dental Student Intake	n/a	n/a	n/a			
Science Intake	40	0	0	-100	0	-100
Total Undergraduate Intake	135	99	125	-27	26	-7
Teacher:Student Ratio	1:10	1:8	1:12			
Lecture Hours	207	178	127	-14	-29	-39
Practical Hours	120	86	82	-28	-5	-32
Tutorial Hours	0	0	0			
Total Contact Hours	327	264	209	-19	-21	-36
Total Postgraduate Intake	3	0	0	-100		-100

full body dissection. St. Andrew's does not offer tutorials in anatomy. St. Andrews does not have a professorial appointment and there were no postgraduates studying within the school in 2003/4.

Discussion

The individual prioritisation of influences, both internal and external, has led to a diversity of infrastructural options within the anatomy schools of Scotland although three basic factors are common to each facility:

- The number of teaching staff has experienced decline
- The student intake has risen
- The number of contact hours has declined

It is rather self explanatory through natural mathematical principles that if one of the supportive factors declines and one of the demanding factors increases then the outcome will be a depletion of the contact available between the two. So whilst the principle is common to each facility, the degree of the proportion of increase to decline has varied. Whilst the inherent medical (and dental) student number increased at all schools, Dundee and Glasgow have seen an additional substantial rise in the number of science students which adds additional strain on an already weakened staff profile. Not surprisingly, both of these universities have seen a less dramatic loss of teaching staff and they have retained clinical demonstrator posts to meet the demands of the student diversity. The unique increase in the size of Glasgow's science course in conjunction with the retention of the largest number of medical student contact hours has resulted in them experiencing the highest staff:student ratio in Scotland. Therefore increasing science student number does

seem to have aided the retention of staff posts but medical students will have to compete for staff time.

Of all the facilities in Scotland, Edinburgh has probably changed the most in the last 20 years and St. Andrew's the least. Edinburgh has seen the largest percentage loss of teaching staff despite having the largest intake of medical students – as a result the staff:student ratio is the second highest in Scotland. Edinburgh has seen the greatest loss in contact time with medical students in Scotland (85%) through a 92% loss in lecturing and a 78% loss in practical time, tutorials are not offered and dissection has been discontinued. In this situation, despite the rise in medical student number, staff replacements have not been maintained and the teaching mode has been dramatically altered to retain anatomical input to the curriculum. Personal communication from staff has alluded to a curriculum that is highly repetitive and generally unrewarding and demoralising for the staff.

Although St. Andrew's has not replaced the 3 demonstrator posts present both in 1983 and 1993 it has retained its full teaching compliment of 10 staff – 6 are full time and 4 are either part time or honorary. St. Andrew's is the only facility to utilise honorary staff members. Contact time with medical students has decreased the least at 36% with a small loss in lecture time and a small loss in practical time. Tutorials are not offered and full body dissection has been retained. The result is that St. Andrew's offers the lowest staff:student ratio in the country at 1:12 which compares very favourably with the situation 20 years previously which showed a ratio of 1:10. This university has safeguarded its teaching positions despite a small reduction in the overall student intake and as a result it has shown the least dramatic alteration to its contact time with the medical students and the nature of the curriculum that it provides.

The recommendations of the GMC were that didactic teaching was to be reduced and small group teaching was to be encouraged. Alterations in response to these recommendations would only be represented in the second decade of this study and it is interesting to note that the largest changes to the contact time occurred during this period indicating the operational influences of the recommendations. Principally the didactic element of the process was seen as a reduction in lecture time and this was most aggressively adopted by Glasgow who decreased their lecture provision in that decade by 94%. St. Andrew's responded with a 29% reduction compared to a 14% reduction in the previous decade but both Dundee and Edinburgh lost more lecture time in the first decade than they relinquished in the second decade of this study. It was also a recommendation that small group teaching be increased whether through tutorials or small group practical sessions. All facilities saw a continued decrease in practical provision with Dundee and St. Andrew's (the two Universities that still hold whole body dissection) giving up significantly less practical time in the second decade than they relinquished in the first decade of this study. With regards to tutorial time, Glasgow responded most positively whilst Dundee, Edinburgh and St. Andrew's still do not offer this facility.

Dissection has unquestionably been a casualty of the downsizing of anatomy, being seen as a time consuming and sometimes indulgent means of knowledge transfer. Interestingly, those departments who have retained this activity have responded less aggressively to the overall pattern of GMC recommendations. It is reassuring to find that none of the Scottish facilities have completely abandoned their dissecting room activities or indeed have any imminent intention to do so.

Anatomy in Scotland is facing a crisis where staff recruitment is increasingly difficult to secure, morale is low and investment is, at best, sporadic. In opposition to most medical educationalists, there is strong support from medical students and many clinical staff to uphold the traditions of basic medical education prior to addressing the more detailed and applied clinical issues. In the final conclusion from the BMA junior members' forum⁵, it was advocated that 'anatomy must remain a fundamental part of the medical degree and not be crowded out by newer subjects'. In that article, Barker went so far as to express 'anatomy has been downgraded to the extent that there are few resources left with which to teach it'. Investment in this resource, which has such a rich heritage in Scotland, must be encouraged before it is too late and the subject deteriorates further, beyond a point of no return. The proposed and imminent amendments to the Anatomy Act in Scotland make this a timely opportunity to reassess the condition of anatomy in Scotland and assist this core subject to reshape into a discipline that is truly fit for purpose.

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