Original article

Research output of a cohort of orthopaedic consultants in Great Britain

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There has been renewed emphasis on research following the Calman recommendations for higher training. It is often considered essential for progression in training to have participated in research projects and to have some publications to one's credit. Orthopaedic surgery is usually thought to lag behind other disciplines in this respect. It was decided to conduct a review of the research output of a cohort of orthopaedic consultants in Great Britain to obtain baseline information for future comparisons. A group of surgeons who graduated at least 25 years ago was chosen as it was felt this would provide the pattern of research output throughout the surgical career of the cohort. The type of publication and the various factors that may affect research output were studied. There was a significant difference in the output of consultants working in teaching hospitals and large centres compared to those in district general hospitals. Is the soil as important as the seed?

Key words: Orthopaedic surgery – Publications

Research has gained renewed importance with the advent of structured higher training for medical specialists in Great Britain. Royal colleges of various disciplines require senior trainees to take part in research. Up to a year in an approved research post can count towards the training period for attainment of a certificate of completion of specialist training.¹

However, completed research and publications have been considered important for career progression by trainees long before this. Having published data was a good predictor for selection to senior registrar posts.² The traditional view has been that trainees should publish in peer-reviewed journals. Whether publication is a good criterion is debatable as it does not always imply that the person has necessarily gained good training in research

methods.³ On the other hand, it does have the advantage of visibility and ease of comparison.

A survey was conducted of the research output of a cohort of orthopaedic consultants in Great Britain as determined by publication in peer-reviewed journals from graduation for a period of at least 25 years. The aims were to establish a baseline for comparison with succeeding generations of surgeons as well as to determine trends and factors which may affect such output.

Materials and Methods

A cohort of orthopaedic consultants in Great Britain was studied. The inclusion criteria were: (i) all were in post as a consultant in Great Britain in 1999–2000; (ii) all had

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Table 1 Summary of the data

Period	n	Publications				
		Total	Group 1	Group 2	UK graduates	Non-UK graduates
1 (up to 1980)	60	167 (2.8)	24 (3.4)	36 (2.4)	54 (2.8)	6 (2.5)
2 (1981–1985)	127	493 (3.9)	42 (4.7)	85 (3.5)	118 (3.8)	9 (4.8)
3 (1986–1990)	135	497 (3.7)	47 (5.6)	88 (2.7)	118 (3.8)	17 (2.9)
4 (1991–1995)	117	404 (3.5)	49 (5.4)	68 (2.1)	103 (3.6)	14 (2.3)
5 (1996–2000)	103	294 (2.9)	45 (4.2)	58 (1.8)	91 (3.0)	12 (2.1)
Total	191	1855 (9.7)	59 (16.9)	132 (6.5)	165 (10.4)	26 (7.1)

For the publications, the first number refers to the total papers published with the mean in parentheses; *n* refers to the number of consultants publishing in a given period.

acquired their basic medical qualification in the period 1971–1975; and (iii) all were Fellows of the British Orthopaedic Association (BOA). The information for determining the above was obtained from the BOA list of members 1999 and 2000, The Medical Register of the General Medical Council and *The Medical Directory*.^{4–6}

The institution to which the consultant was attached (*i.e.* teaching hospital, centre of excellence in orthopaedics or a district general hospital [DGH]) was noted.

The computer database for medical peer-reviewed publications (OVID-MedLine) was accessed for data on the individual's research output over a 25-year period after 1975 – namely until 1980, 1981–1985, 1986–1990, 1991–1995, and 1996 onwards.⁷ During each of these periods, the number of publications in peer-reviewed journals credited to the author was noted. Further, the publications were divided into letters or correspondence, case reports, and articles.

Statistics

The number of publications per consultant for the entire duration of the study and in the individual components of the study period in the two groups (*i.e.* teaching hospitals and DGHs) was compared using the unpaired *t*-test (2 tailed).⁸

Results

A total of 191 orthopaedic surgeons fulfilled the criteria listed above and formed the cohort. Of these, 165 had qualified in UK while 26 had acquired their primary qualification outside UK. In terms of year of qualification, 42 qualified in 1971, 38 in 1972, 33 in 1973, 34 in 1974 and 44 in 1975. In terms of workplace, 59 consultants worked at a teaching hospital or a large orthopaedic centre (group 1) while 132 were attached to a DGH (group 2).

The cohort had 1855 publications to its credit for the study period. The average research output for the whole cohort over the entire study period was 9.7 publications (range, 0–75). Of the total cohort, 185 surgeons had at least 1 publication to their credit (mean, 10; range, 1–75) while 6, all of whom worked at a DGH, had no publications during the entire period.

When the five periods in the study were examined, the third period had the maximum number of surgeons who published, although the total and average number of publications was higher during the second period (Table 1).

Only 24 surgeons had publications in each of the 5 periods studied. This was the most prolific group with a total of 580 publications to their credit at an average of 24.2 publications each (range, 6–75). Of these, 22 had qualified in the UK and 16 worked at a teaching hospital or large orthopaedic centre.

The 59 surgeons in group 1 had a total of 996 publications for the entire period at an average of 16.9 publications each (range, 1–75). The 132 surgeons in group 2 had a total of 859 publications for the entire period to their credit at an average of 6.4 publications each (range, 0–44). If only the 126 surgeons who had at least one publication to their credit were considered, this average rose to 6.8 (range, 1–44). The difference between the 2 groups was statistically significant ($P = 0.0001$). This difference was also significant for each of the separate periods studied.

The 165 UK graduates had a total of 1691 publications to their credit at an average of 10.4 publications each (range, 1–75) with 162 surgeons having at least 1 publication to their credit. The 26 non-UK graduates had a total of 164 publications to their credit at an average of 7.1 publications each (range, 1–26) and 23 surgeons had published at least once. The difference between the two groups was not statistically significant. The UK graduates peaked in the second period both for the number of consultants who published and the number of publications and this carried

Table 2 Type of publication

	Articles (%)	Case reports (%)	Letters (%)	Total
Group 1	920 (92.4)	35 (3.5)	41 (4)	996
Group 2	777 (90)	48 (6)	34 (4)	859
UK grad.	1549 (92)	72 (4)	70 (4)	1691
Non-UK grad.	148 (90.2)	11 (6.7)	5 (3)	164
Total	1697 (91.5)	83 (4.5)	75 (4)	1855

on to the third period. The number of non-UK graduates publishing peaked during the third period indicating some delay or lag in their publications. The minority who did publish in the second period have an average which was higher than that of the UK graduate group.

Of the total 1855 publications, 1697 were articles, 83 were case reports and 75 were letters. The distribution for the 4 groups is detailed in Table 2. Apart from the fact that case reports constituted 6.7% of the total for the non-UK graduates compared to 4% for the UK graduates, there were no marked differences in the various groups.

Discussion

There was a significant difference in the research output of groups 1 and 2 (teaching hospitals versus DGHs). It is interesting to note that the difference is first noticeable in the second period and is maximum in the third period (Fig. 1). Of the 59 members of group 1, 16 had publications in each of the five periods while only 8 of the 132 members of group 2 did so. This possibly reflects the better opportunities and facilities for research in the large centres and teaching hospitals.

The trend of research output over the five periods studied is logical (Table I). Period 1 is generally spent in deciding future career and specialisation. Only 60 of the cohort had publications during this period. The second period marks a later stage in training. Of the cohort, 127 published during this period. Period 3 is the transition zone from training to career as a consultant. Of the cohort, 135 had publications during this period. The fourth period is the consolidation period as a consultant and the number publishing during this period dropped to 117. This dropped further to 103 during the last period. Some of the publications during periods 3 and 4 reflect work or research done during the earlier periods. The drop in the number of consultants publishing during the later periods was more pronounced in group 2 than group 1 (Fig. 2).

The differences in the publication patterns of UK and non-UK graduates perhaps reflects the early years spent in the country of qualification where publication is

Figure 1 Variations in the mean number of publications over the study duration.

Figure 2 Proportion of surgeons publishing during each study period.

possibly not a priority or publications in journals not included in MedLine distorts the data. Non-UK graduates are also more likely to spend their early years in the UK in smaller hospitals with less access to research facilities and less impetus to publish. Despite this, those non-UK graduates who published in the second period did so at an average matching that of group 1. It may be interesting to study this sub-group in detail.

How will the Calman training scheme affect research output? There may be increased impetus for trainees to publish, but the rotation between hospitals and shorter periods spent in each hospital may influence the type of research favoured by the trainees. A survey of basic surgical trainees has revealed that the majority planned to publish

prior to applying for higher surgical training posts.⁹ The current forced and fortuitous break between basic and higher surgical training provides an opportunity.

Our survey shows that articles form the bulk of publications. We did not look into the precise nature of the article, *e.g.* randomized trial, prospective study, retrospective study, meta-analysis, review article, *etc.* A recent survey looking into orthopaedic publications in a select group of journals studied this, as well as the regional distribution of publications (spine, shoulder, hip, knee, hand, *etc.*).¹⁰ It was noted that very few trials were published in the study period (September 1994 – August 1999). Most publications were of a non-clinical academic nature. A shortage of case reports was also noted. It is possible that research is now being carried out at an earlier stage in the career and is more laboratory-based than hospital-based. This was further re-inforced by the findings of a survey of presentations at the meetings of the Surgical Research Society.¹¹

There are many orthopaedic surgeons in Great Britain who are no longer in training but are not appointed to a consultant post. The research output and ability of this group of non-consultant career grade doctors is unknown. Trainees and consultants receive encouragement and incentives from the Royal Colleges and the BOA to participate in research. Similar resources should be made available to the non-consultant career grade doctors to utilise their experience fully.

The BOA must embark on a project of collecting accurate and detailed data on its members' and fellows' publications. A research register has been set up for on-going and

completed research and collection of data on previous publications can be an extension of the register.¹² It will require resources and may entail considerable effort and expense. However, it will provide a valuable database and help develop and plan future efforts in promoting research activity and for sharing and pooling of experience and knowledge.

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