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Research directions and output in European dental schools

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Summary

Information pertaining to the research directions and output of dental schools in different countries is of importance in understanding intra- and inter-national differences amongst groups of dental practitioners. The research output of European dental schools has been assessed quantitatively and qualitatively on the basis of published abstracts of research presentations at IADR-meetings during 1993. These data are compared with comparable data for 1990/91. The results indicate that European dental schools are substantially different in terms of research output relative to total population, with the UK at one extreme and Italy at the other. The UK, Denmark, The Netherlands, Sweden and Norway are highly ranked while Portugal, Spain, Italy, Germany and France have low rankings, according to the method used. Periodontology, plaque, dental materials, and restorative dentistry would appear to be the principal foci of research. Possible ways of strengthening the coordination and the efficiency and effectiveness of dental research at the European level are discussed. It is suggested that the creation of centres of excellence and research networks are approaches to be considered. An unresolved problem will be the contradictory requirements from educational and research perspectives in relation to the training of dental practitioners.

Research is central to academic endeavours both to advance knowledge and to complement teaching. Research in dental schools is therefore relevant to the process of preparing students for their future roles in dentistry and to members of the profession better meeting the dental needs of the populations they serve. Consequently, information pertaining to the research directions and output of dental schools in different countries is considered to be of importance in understanding intra- and inter-national differences between groups of dental practitioners.

Attempts to strengthen unity in the European Union (EU) can be observed in many diverse aspects of society within each of the member States. Science being international by nature and fundamental to the success of the EU, must be coordinated and organised centrally within the Union. Remarkably little information appears to be gathered in a systematic way pertaining to the quantity and quality of research being undertaken in different subject areas across the Union – a process considered central to developing EU research policy.

Quantitative and qualitative data on output in dental research in the EU is difficult to obtain – a situation which is not believed to be unique to dentistry. In a first attempt to give some insight into this aspect of dentistry in the EU, Plasschaert¹ measured the research output for the EU States and the dental schools within each State on the basis of the number of abstracts of communications presented at 1990–91 meetings of the International Association for Dental Research (IADR). This work, despite its acknowledged limitations, indicates that the UK had the highest actual output, with Norway having an equivalent output when expressed in terms of average number of papers per dental school.

The purpose of the present paper is to report data, collected using the methods previously reported by Plasschaert¹, for the research output in dentistry in the EU during 1993. These data are compared with Plasschaert's 1990–91 data. Also an attempt is made to describe the situation within and between EU States in a more qualitatively way with conclusions being drawn concerning the need for more sophisticated studies in this area.

Table 1 Details of the number of IADR abstracts in 1990/91 and 1993 according to EU State numbers of dental schools and population figures.

Country	No. of dental schools included	No. of abstracts (av. per school)		Pop. x10 ⁶
		1990/91	1993	
United Kingdom	13	468 (29.2)	509 (39.2)	57.0
Germany	17	82 (7.4)	118 (6.9)	61.0
Netherlands	3	81 (20.3)	75 (25.0)	14.8
Denmark	2	44 (22.0)	71 (35.5)	5.1
Sweden	3	75 (18.8)	67 (22.3)	8.0
Finland	3	66 (16.5)	59 (19.7)	4.6
Switzerland	3	66 (22.0)	51 (17.0)	6.0
Norway	2	64 (32.0)	42 (21.0)	3.7
France	5	59 (9.8)	31 (6.2)	56.0
Ireland	3	31 (10.3)	36 (12.0)	3.5
Belgium	2	24 (8.0)	15 (7.5)	9.9
Italy	2	14 (4.7)	10 (5.0)	57.0
Greece	1	11 (11.0)	8 (8.0)	10.0
Portugal	1	-	3 (3.0)	9.9
Spain	-	3 (3.0)	-	38.8

*NIOM, Haslum has not been included (5 abstracts)

Materials and methods

A total of 3370 abstracts were screened from the meetings of the Scandinavian and Continental European Divisions (Kolding, 1993), the British Society for Dental Research, incorporating the IADR British Division (Surrey, 1993), the Irish Division (Cork, 1993) and the General Meeting of the International Association for Dental Research (Chicago, 1993) of the IADR. The number of research presentations at each of these meetings was counted for each EU State and the dental schools within each State. Joint projects from two or more schools were counted towards the total for each school and, where appropriate, State.

Dental schools with an output of less than 3 abstracts in either 1990/91 or 1993 were excluded. For the qualitative assessment keywords were attributed to each of the 1993 abstracts to describe the field of research. For each school the areas of principal research output were recorded, according to the number of abstracts in various fields.

Results

Details of the number of abstracts from each State during 1993 are set out in *Table 1*. The data collected according to the schools within each State are set out in *Tables 2-5*. For ease of comparison the corresponding data from the 1990/91 survey has been included in the *Tables*.

Discussion

Measuring research output is complex. Using the number of abstracts of presentations included in the meetings of a specific organisation is a less than ideal method to

Table 2 Details of abstracts from leading dental schools in France, Greece, Italy, Spain and Portugal, presented at IADR meetings in 1990/91 and 1993.

Country dental school	No. of papers		Principal Topics
	1990/91	93	
France			
Nantes	7	10	periodontal surgery odontogenesis
Paris V & VII	13	22	
Strasbourg	12	5	odontogenesis
Montpellier	7	5	
Lyon	11	4	
Greece			
Athens	11	8	dental materials
Italy			
Bologna	5	3	restorative dentistry adhesion, bonding
Siena	0	7	
Spain			
-	-	-	-
Portugal			
Lisbon	0	3	epidemiology

obtain a robust measure. Limitations of this approach relate to substantial differences among and within EU States in terms of the availability of funds to travel and attend research meetings, the importance of contributing to conference proceedings, and different perceptions of the benefits of such activity. However, given the pre-eminence and multidisciplinary nature of IADR meetings in the field of dental research and the simplicity of the methods used, it is suggested that the data presented is of certain value and could be viewed as the best available guide as to changes in research output and research interests amongst and within the States of the EU at the present time.

From the data presented and comparisons between the 1990/91 and 1993 findings, it may be concluded that there is some evidence to the effect that there are sub-

Table 3 Number of abstracts from leading dental schools in Belgium, Denmark, Germany and The Netherlands presented at IADR meetings in 1990/91 and 1993.

Country dental school	No. of papers		Principal Topics
	1990/91	93	
Belgium			
Brussels	9	5	
Leuven K.U.	8	10	composite, dent mat, implants, periodontology
Denmark			
Aarhus	20	43	caries diagn, perio, microb, cytot, hard tissues
Copenhagen	24	28	ceramic rest, caries, plaque, perio, microb
Germany			
Berlin F.U.	15	15	dental materials, compos, prosth dent, implants
Tübingen	10	12	ceramics, titanium
Freiburg	6	12	woundhealing, implants, laser, perio, plaque
Regensburg	6	12	dentine bonding & biology, restorative dentistry
Bonn	0	8	laser, periodontal diagnosis
Marburg	16	8	periodontology
Münster	3	6	periodontology
Kiel	0	6	periodontology
Heidelberg	0	5	restorative dentistry
Hannover	5	5	biocompatibility, dental materials
Erlangen	6	5	restorative dentistry, CAD/CAM
Aachen	0	4	bonding
Mainz	0	4	
München	0	4	restorative dentistry, fixed prosthodontics
Erfurt	0	4	
Hamburg	0	3	
The Netherlands			
Amsterdam	37	36	dental mat, perio, biochem, radiol, microbiol
Nijmegen	26	20	restor. dent, prost. dent, caries diagnosis,
Groningen**	13	19	adhesion, caries detect, tooth colour, chlorhexidine

**School closed in 1992

Table 4 Details of abstracts from leading dental schools in Ireland and United Kingdom, presented at IADR meetings in 1990/91 and 1993.

Country dental school	No. of papers		Principal Topics
	1990/91	1993	
Ireland			
Belfast	22	19	oral pathology, periodontology
Cork	8	12	epidemiology, periodontology
Dublin	0	5	oral pathology
United Kingdom			
London HMC	38	59	oral path, perio surg, bioch, plaque, public health
London IDS	35	67	oral path, bone, perio, implants, plaque microb, laser
London UMDS	35	47	microbiology, immun, oral pathology, periodontology
London KCSMD	35	35	periodontology, oral pathology, root caries, saliva
Cardiff	39	53	tissue regeneration/perio, oral path, plaque microb
Manchester	38	42	dent health services, rest dent, cross inf, oral surg
Birmingham	18	33	oral surg/path, dent hlth serv, caries epid, prosthet
Glasgow	40	31	pulp, caries diag/epid, oral surg, rest dent, perio
Newcastle	41	29	dent mat, oral surg/path, plaque, ortho, epidemiol
Dundee	23	24	caries diagn, health services, epidem, oral pathology
Leeds	35	23	amelogenesis, dent health serv, oral surg, fluoride
Sheffield	21	23	regener bone/nerv, plaque micr, dent mat, perio
Bristol	37	21	oral pathology (tumour/HIV), restorative dentistry
Liverpool	16	17	microbiology, saliva, oral pathology
Edinburgh	17	5	oral surgery/pathology

Table 5 Details of abstracts from leading dental schools in Finland, Norway, Sweden and Switzerland, presented at IADR meetings in 1990/91 and 1993.

Country dental school	No. of papers		Principal Topics
	1990/91	93	
Finland			
Helsinki	25	28	tooth morphology, perio, microb, saliva, epidem
Turku	21	20	saliva, xylitol, plaque, microb, craniofacial. biol
Kuopio	10	11	saliva, craniofacial. biology
Norway			
Oslo	30	31	mouthrinses, plaque, perio, biochem, chlorhex
Bergen	34	11	periodontology, caries
Sweden			
Göteborg	32	28	caries prevention, fluoride, chlorhexidine, diet
Stockholm	25	25	crevic.fluid, fluoride, perio, microb, biochem
Lund	12	14	microbiol, gingivitis, diet, caries, chlorhex
Switzerland			
Bern	36	23	implants, perio, dent radiology imaging
Zürich	21	21	microbiology, caries, perio, TMJ, implants
Geneva	9	7	dental materials

stantial differences in the research output of dental schools relative to total population, with the UK at one extreme and Italy at the other. The UK, Denmark, The Netherlands, Sweden and Norway are highly ranked, while Portugal, Spain, Italy, Germany and France have low rankings, according to the method used. The major emphasis in dental research within the EU seems to be in the fields of periodontology, plaque, dental materials, and restorative dentistry. It is difficult to detect any structure or coherence in dental research activities at the European level.

However, a more objective overview of European dental research may need to await the outcome of a planned extension to the present study to undertake the much larger task of surveying the dental literature to collect data on publications in peer reviewed journals. Such additional work should provide more robust data, but in similar ways to the present study may be seen to suffer certain limitations given differences in publication times between journals, different patterns of publication in different subject areas and possible trends towards increasing output in journals outside the dental area. An alternative approach to this problem would be to request details of all publications and published abstracts from the Deans of dental schools within the EU. This approach would have many merits, but to be of any value, would demand a high response rate from the Deans who already tend to receive many requests for information which may not be readily available and thus require substantial administrative effort to generate.

On balance, it is suggested that for immediate purposes a crude measure of output is better than no measure and that the collection of crude data pertaining to all schools is better than the collection of complete data from only a proportion of schools.

If a research policy is to be developed for dentistry at the European level, future trends must be considered.

On one hand, there is the need for increasing emphasis on the importance of research in dental schools to maintain dental education at an academic level. To this end it is essential that each dental school has a range of research interests relating to the various dental disciplines. On the other hand, there must be a move away from the same subjects being investigated in many schools in the EU, albeit from different points of view and in different ways, given that there must be unnecessary duplication and misuse of resources. This cries out for co-ordination, rather than separate State initiatives, aimed at the more efficient and effective use of manpower, expertise and the relatively limited funds available to support research in dentistry in the Union. One may think of two approaches to achieve this goal:

Centres of excellence

One may think of creating centres of excellence for dental research, providing opportunities for 'cutting edge' research workers, opinion leaders, doctoral and postdoctoral students and clinicians of international renown to interact and cross-fertilise, together with experts in disciplines allied to dentistry. Special types of equipment can and should be sited in selected centres with arrangements for access by researchers in the field. A possible disadvantage of such arrangements may be the administrative overload and bureaucratic processes which may be involved.

Networking

Selected schools could form networks and coordinate certain efforts, as is the trend in certain forms of funded research. Experts in a specific field from various universities in Europe should be given many more opportunities to

work together to develop research programmes to be carried out in a complimentary way or in open competition by the participating groups. However, in the opinion of the authors, much remains to be done to simplify the setting up and running of networks – excessive bureaucracy being a major disincentive to much needed interaction in the research community. Furthermore the development of networks should be based on a sound, well research strategy which currently does not exist for dentistry at the European level.

The need to 'concentrate' resources has recently been addressed in a review of dental research by the British Medical Research Council²:

'..resources should be concentrated largely, though not exclusively, on establishing multidisciplinary research teams in centres of excellence. These teams should include both basic and clinical research workers and may cross departmental and faculty boundaries. However the critical factor in deciding funding should be the scientific merit of the proposals, not the disciplinary approach'.

An unresolved problem will be the contradictory

requirements from educational and research perspectives, in relation to the training of dental practitioners. The challenge will be to reconcile these two opposing requirements. Whatever the developments will be, overall planning of how and where to expend human resources and funding in dental research deserves much more attention at the European level, assuming that the member States have separate systems to set research priorities and policies. After all, universities exist to teach that which is known and to extend existing knowledge, understanding and perception. These roles are intertwined: inspired teaching at the highest level is sustained by the excitement of the search for the new and by the desire to communicate that which is already realised and accepted.

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Orientations de recherche et informations fournies par les écoles dentaires européennes

Résumé

Les informations relatives aux axes de recherche et à celles fournies par les écoles dentaires des différents pays sont importantes pour comprendre les différences nationales entre les pays, et à l'intérieur de chaque pays, parmi les groupes de praticiens dentaires. Les résultats des recherches des écoles dentaires d'Europe ont été évalués quantitativement et qualitativement d'après les résumés publiés des communications de recherche, présentées pendant les sessions de l'IADR durant 1993. Ces données sont comparées aux données comparables pour 1990/1991. Les résultats indiquent que les écoles dentaires européennes sont sensiblement différentes en ce qui concerne la diffusion sur leurs informations de recherche à l'intention de l'ensemble de la population, le Royaume-Uni se trouvant à un extrême et l'Italie à l'autre. Selon la méthode utilisée, le Royaume-Uni, le Danemark, les Pays-Bas, la Suède et la Norvège ont un niveau élevé, alors que le Portugal, l'Espagne, l'Italie, l'Allemagne et la France ont un niveau faible, La parodontologie, la plaque, les produits dentaires et la dentisterie restauratrice sembleraient être les principaux centres d'intérêt de la recherche. Les moyens éventuels permettant de consolider la coordination, l'efficacité et l'efficacité de la recherche dentaire au niveau européen sont discutés. La création de centres de pointe et de réseaux de recherche sont proposés comme des moyens à étudier. Un problème non résolu sera les contradictions des perspectives de la recherche et de l'enseignement par rapport à la formation des praticiens dentaires.



Forschungstrends und -output in europäischen zahnmedizinischen Hochschulen

Zusammenfassung

Informationen über Forschungstrends und -output in zahnmedizinischen Hochschulen in verschiedenen Ländern sind wichtig, um intra- und internationale Unterschiede unter den Zahnärztegruppen zu verstehen. Das Forschungsoutput europäischer zahnmedizinischer Hochschulen ist quantitativ und qualitativ auf der Basis der veröffentlichten Abstracts zu Forschungsarbeiten, die während der IADR-Tagungen 1993 vorgestellt worden sind, ausgewertet worden. Diese Daten werden mit gleichartigen Daten für 1990/91 verglichen. Die Ergebnisse weisen darauf hin, daß sich die europäischen zahnmedizinischen Hochschulen in bezug auf das Forschungsoutput im Verhältnis zur Gesamtbevölkerung erheblich – mit dem Vereinigten Königreich und Italien als gegensätzliche Extreme – unterscheiden. Gemäß den angewandten Auswertungsmethoden sind das Vereinigte Königreich,

Dänemark, Niederlande, Schweden und Norwegen führend, während Portugal, Spanien, Italien, Deutschland und Frankreich an unterer Stelle stehen. Parodontologie, Plaque, zahnärztliche Materialien und restaurative Zahnmedizin schienen die Hauptforschungsbereiche zu sein. Es werden die möglichen Wege zur verstärkten Koordination und Verbesserung der Effizienz und der Effektivität der zahnmedizinischen Forschung auf europäischer Ebene diskutiert. Es wird vorgeschlagen, daß die Schaffung von Forschungszentren und -netzwerken als ein Ansatz berücksichtigt werden sollte. Ein ungelöstes Problem sind die widersprüchlichen Erfordernisse aus der Ausbildungs- und Forschungsperspektive in bezug auf die Ausbildung von Zahnärzten.



Tendencias y productividad en investigación de las Escuelas de Odontología Europeas

Resumen

La información relacionada a las tendencias y rendimiento en investigación de escuelas dentales de diferentes países, es muy importante para comprender las diferencias intra -e internacionales entre grupos de odontólogos en ejercicio. El rendimiento en investigación de las escuelas dentales europeas ha sido evaluado cuantitativamente y cualitativamente en base a los resúmenes publicados de los trabajos de investigación presentados en las reuniones de la IADR durante 1993. Estos datos son comparados con datos similares de 1990/91. Los resultados indican que las escuelas dentales europeas difieren sustancialmente en lo que se refiere a la productividad en investigación en relación con el total de la población, con el Reino Unido en un extremo e Italia en el otro. El Reino Unido, Dinamarca, los Países Bajos, Suecia y Noruega ocupan un lugar ?? muy alto, mientras que Portugal, España, Italia, Alemania y Francia presentan bajos niveles, de acuerdo con el método utilizado. La investigación parece concentrarse en la periodontología, placa dental, materiales dentales y odontología reparadora. Se discuten las posibles líneas de acción para fortalecer la coordinación y la eficiencia y eficacia de la investigación dental a nivel europeo. Se sugiere que debería considerarse la creación de centros de excelencia y de redes de investigación. El problema que tendrá que resolverse serán los requisitos contradictorios desde el punto de vista educacional y de investigación, en relación a la formación de odontólogos generales.

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