EDUCATION

Undergraduate training as preparation for vocational training in England: a survey of vocational dental practitioners' and their trainers' views

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"There is anecdotal evidence that vocational trainers perceive that undergraduate training has been diluted over the last few years..."

Aims To compare the views of new vocational dental practitioners (VDPs) and their trainers regarding how undergraduate dental education has prepared them for their vocational training (VT) in England. This study also aims to identify areas of relative weakness in dental undergraduate education that could influence the future training needs of vocational trainees.

Method Structured postal questionnaires were completed by VDPs and trainers from five Deaneries in England. The usable response rate was 71% (n = 186 VDPs and 186 trainers).

Results The vast majority of VDPs and trainers perceived the undergraduate training in history taking, diagnosis and treatment planning for general practice to have been covered 'well' or even 'very well'. Undergraduate training in routine restorative dentistry, oral pathology and paediatric dentistry was also perceived to have been covered well. However, a large proportion of VDPs and trainers reported that they felt that undergraduate training in orthodontics, molar endodontics, surgical endodontics and surgical extraction of teeth had not adequately prepared them for VT.

Conclusions Newly qualified dentists appear to lack certain competencies recommended by the General Dental Council in *The First Five Years*. This has implications for dental undergraduate education, but also highlights current training needs during VT.

INTRODUCTION

In October 1993, after a number of years as a voluntary scheme, a one-year period of vocational training (VT) became a mandatory requirement for all new UK dental graduates who wished subsequently to practice as a principal within the National Health Service. The General Dental Council (GDC) has strongly endorsed this arrangement, which *'allows a gradual and controlled transition from the shelter of undergraduate education to unsupervised practice'.*[1]

The GDC's document *The First Five Years*[1] also provides a framework from which UK dental schools can structure their undergraduate curricula. The explicit overall aim is *'to produce a caring, knowledgeable, competent and skilful dentist who is able to accept professional responsibility for the effective and safe care of patients on graduation'.*[1]

Cabot and Radford suggested in 1999[2] that the consumers of dental education are the patients, but also the graduates themselves, as it is they that are 'purchasing' an education. But are new graduates fully satisfied with their 'purchase'?

In recent years there has been an increased interest in the issue of dental education, with the *British Dental Journal* recognising the importance of the topic by devoting a Section to it. However, although several papers have assessed the value of the vocational training experience, there is a lack of research that reports the views of newly qualified dentists and VT trainers on how well the undergraduate course prepares for life in general practice. Those that do exist note that new graduates considered their undergraduate course to be lacking in some key areas[3,4] and only one has been published since VT became mandatory.[5] There is anecdotal evidence that vocational trainers perceive that undergraduate training has been diluted over the last few years and new graduates are not as capable, practically, as they once were. The primary aim of this current study, therefore, was to compare the current views of new vocational dental practitioners (VDPs) and their trainers, regarding how undergraduate dental education has prepared them for their VT in England. A secondary aim was to identify areas of relative weakness in dental undergraduate education that could influence the future training needs of vocational trainees, allowing the various under- and postgraduate authorities to plan future dental education more effectively.

METHOD

The sample

The sample was drawn from VDPs who commenced VT from August 2004 and their trainers. Questionnaires were posted to the following VT Deaneries in England:

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Yorkshire, South Yorkshire & Trent, Northern, Mersey, and West Midlands. These Deaneries were selected as they had agreed to participate in the study. Following distribution by the local organisers, the participants posted the questionnaire using a reply-paid envelope to improve the response rate. A postal questionnaire was deemed to be the simplest and quickest method of obtaining mass information from VDPs and trainers located widely.

The questionnaire

Questionnaire design was informed by discussion with various VT advisors, dental academic staff and through a focus group of 12 VDPs and trainers from the Leicestershire VT scheme.

A pilot questionnaire was posted to 24 VDPs and their trainers within the Trent Deanery in March 2005. Twenty-four VDPs (100%) and 19 trainers (79%) responded. The final, anonymous, questionnaires were then distributed by VT organisers to the Deaneries noted above in April 2005. The structure of the questionnaire sent to the VDPs is shown in Figure 1.

Each VDP and trainer completed identical surveys. Each trainer stated the number of years they had been a VT trainer and each VDP was asked to indicate their gender and the dental school from which they graduated. The participants' attitudes were measured using a four-point scale. Each participant selected 1, 2, 3 or 4 for each of the clinical areas mentioned in the survey (1 = very well prepared, 2 = well prepared, 3 = poorly prepared, 4 = very poorly prepared).

RESULTS

Of the 522 questionnaires that were posted, 372 were returned (186 VDPs and 186 VT trainers). There was a usable response rate of 71% after incomplete papers were discarded. Of the VDP respondents, 113 (61%) were male and 73 (39%) female. An average of 4.3 years involvement in vocational training was noted amongst the respondent trainers.

Table 1 demonstrates that the respondents originated from a range of dental schools (nine out of a potential 13 undergraduate UK dental schools). Table 2 shows the response rate in relation to each VT Deanery. The responses were divided into the categories listed below.

Patient assessment

For history taking and examination of patients, nearly all of the VDPs (97%) believed they were prepared 'well' or 'very well' by their undergraduate course. The vast majority of VT trainers (93%) agreed with this.

Fifty-six percent of trainers felt that new graduates were 'poorly' or 'very poorly' prepared for diagnosis and treatment planning in general practice and this supports anecdotal evidence where trainers have reported that VDPs have difficulty dealing with patients in acute pain, especially with regard to reaching an accurate diagnosis and carrying out appropriate treatment to relieve pain. However, this contrasts with the perception of the majority of VDPs (82%), who felt confident in this aspect of clinical practice.

Oral surgery

The majority of VDPs (87%) and trainers (77%) surveyed were satisfied with undergraduate experience of non-surgical extraction of teeth. However, both groups agreed that undergraduate experience of surgical extractions was either 'poor' or 'very poor' (VDPs 77%, trainers 83%). Another area regarded as being inadequately covered at undergraduate level was surgical endodontics, with both groups considering training in this field to be inadequate (VDPs 82%, trainers 84%).

Oral medicine/pathology

The vast majority of VDPs (91%) and trainers (84%) perceived training in the management of red/white lesions to have been covered well. The results also highlight confidence amongst both groups with regards to prescribing drugs (VDPs 81%, trainers 79%) and in the management of recurrent ulcers (VDPs 93%, trainers 95%) and dry mouth (VDPs 87%, trainers 86%).

Orthodontics

Sixty percent of VDPs surveyed were not confident with orthodontic case assessment, 72% with the use of fixed appliances and 55% with the use of removable appliances. These views are supported by their trainers. Only 50% of trainers considered new graduates to be prepared 'well' or 'very well' for orthodontic case assessment in general practice. The respondent trainers also perceived an inadequacy in undergraduate orthodontic training with regards to fixed appliances (87%), removable appliances (70%) and in the management of the mixed dentition (65%).

Practice management and clinical governance

A large proportion of trainers reported new graduates as having 'poor' or 'very poor' training in practice management skills such as staff management (85%), employment law (89%) and health & safety (84%). The vast majority of VDPs agreed with these views.

It is clear that most VDPs (61%) and trainers (71%) believe new graduates are well versed in the need for continuing professional development (CPD) after graduation. With regards to other aspects of clinical governance, only a small number of VDPs and trainers were satisfied with undergraduate training in audit and peer review for general practice (VDPs 18%, trainers 20%).

Conservative dentistry

Ninety-seven percent of VDPs and trainers perceived training in restorative materials to have been adequately covered during the undergraduate course. The great majority of VDPs (92%) and trainers (92%) were also happy with the training received for the management of dentine hypersensitivity. Training received for the management of tooth substance loss (TSL) was also considered to have been covered well at dental school

Fig. 1 VDP questionnaire

1. Which Dental School did you graduate from?

2. Gender? (M/F)

3. How well do you feel the teaching, of the following subjects, prepared you for your VT year?
Please answer: *1) Very Well 2) Well 3) Poorly 4) V. Poorly* **(Tick box)**

	1	2	3	4
History taking				
Diagnosis & Rx planning				
ORAL SURGERY				
Extraction techniques (non-surgical)				
Dento-alveolar surgery				
Surgical endodontics				
Management of continued bleeding				
Management of impacted teeth (eg 8's)				
Management of an OAC/OAF				
Local anaesthesia				
Analgesia/antibiotics				
ORAL MEDICINE				
Management of red/white patches				
Prescribing drugs/drug reactions				
Management of recurrent ulcers				
Management of dry mouth				
ORTHODONTICS				
Case assessment				
Removable appliances				
Fixed appliances				
Management of the mixed dentition				
OTHER AREAS				
Career pathways				
Staff management				
CPD				
Audit & peer review				
Employment law				
Health & safety				
RESTORATIVE				
Restorative materials				
Complex endodontics (eg molar endo)				
Crown & bridge				
Tooth whitening				
Management of tooth wear				
Management of dentine hypersensitivity				
PROSTHETICS				
F/F dentures				
P/P acrylic				
P/P Co-Cr				
Immediate dentures				
Impression techniques & materials				
PAEDODONTICS				
Behaviour mgt				
Trauma				
Restorative techniques				
Sedation techniques				
PERIODONTOLOGY				
Non-surgical therapy				
Local & systemic antimicrobial treatment				
Crown lengthening surgery				

Comments:

"Of the trainers surveyed, most perceived undergraduate training in the construction of immediate dentures to be poor, while the majority of VDPs were content with their training in this field."

Table 1 Response rate in relation to dental school of graduation

UK Dental School	Number of graduates (n = 186)
Birmingham	25
Bristol	6
GKT	21
Leeds	37
Liverpool	33
Manchester	23
Newcastle	10
Sheffield	24
QMW	7

Table 2 Response rate in relation to each VT deanery

Deanery	Response rate (%)
Trent & S. Yorkshire	67
Mersey	83
Northern	71
W. Midlands	60
Yorkshire	69

(VDPs 86%, trainers 78%). However, most trainers (71%) were disappointed with the training received for crown and bridge work, stating this to have been 'poorly' or even 'very poorly' covered. About half of the VDPs (55%) agreed with this statement.

Of the VDPs surveyed, most expressed a lack of preparedness with regards to complex/molar endodontics, with 66% rating their preparedness as 'poor' and 3% 'very poor'. The majority of trainers (74%) agreed with this view. Both groups were also dissatisfied with the preparedness in tooth whitening methods (VDPs 91%, trainers 84%).

Periodontology

The majority of VDPs and trainers regarded undergraduate training in periodontology highly, with 'well' and 'very well' being the most common responses. This was especially true for non-surgical therapy (VDPs 98%, trainers 96%) and the use of antimicrobials (VDPs 86%, trainers 83%) in the treatment of periodontal disease.

Prosthodontics (removable)

Of the trainers surveyed, most (68%) perceived undergraduate training in the construction of immediate dentures to be poor, compared to the majority of VDPs (82%) who were content with their training in this field. Overall, the majority of VDPs believed they were prepared adequately at dental school for the construction of removable prostheses in general practice.

Paediatric dentistry

Both groups were found to be satisfied with the training received in paediatric dentistry as a whole. With regard to the restoration of primary teeth, VDPs (90%) and the trainers (96%) believed training to have been adequately covered. Both groups also considered new graduates to be 'well' or 'very well' trained in behaviour management techniques for children (VDPs 95%, trainers 91%).

The majority of VDPs (68%) were also content with the level of undergraduate training received in sedation techniques. However, this view was not supported by the trainers, where slightly over half (53%) considered undergraduate training in this field to be either 'poor' or 'very poor'.

The overall responses from the VDPs and trainers are summarised in Tables 3 and 4. Tables 5 and 6 show the full ranges of scores given by the respective groups.

DISCUSSION

The results of this study demonstrate the opinions of a group of 186 VDPs and 186 VT trainers, regarding the undergraduate dental education of the VDPs. The results were not broken down by dental school, as some schools were not adequately represented and other schools were not represented at all. In recognition of the fact that there are organisational differences in the constituent countries of the UK, this study examined only VDPs and trainers in England.

A questionnaire, returned by post, was deemed to be the simplest and quickest method of obtaining mass information from VDPs and trainers located widely throughout England. One mail-shot, distributed by each regional VT organiser and including a pre-paid envelope, produced an adequate response rate (71%) and so non-respondents were not contacted for a second time. It is, however, conceivable that this may have influenced the obtained results. Interviews were not performed in this study, but may provide valuable and detailed information if carried-out in future investigations.

This qualitative assessment was conducted on a self-selected sample, in that it was these 372 people who decided to participate in this study by returning completed questionnaires from the Deaneries that had agreed to take part. An attempt to reduce the risk of including bias in the questionnaire, regarding preconceptions of undergraduate education, was made via a pilot study of VDPs and through discussions with various VT organisers and dental academic staff. The final list of questions was not exhaustive but reflected concerns highlighted during the piloting process. A four, rather than five point scale was used, with omission of a mid point of 'satisfactorily prepared' in an attempt to concentrate the minds of the respondents and prevent a 'drift towards the mean' that could have masked the positive or negative views. There may be merit in repeating this study in other areas in the UK to determine if these results are representative of a truly national trend.

Table 3 A summary of the clinical fields perceived as being 'poorly' or 'very poorly' covered at undergraduate level

Clinical field	% VDP (n)	% VT trainer (n)
Surgical extractions	77% (143)	83% (155)
Surgical endodontics	82% (152)	84% (156)
Complex/molar endodontics	69% (128)	74% (138)
Tooth whitening techniques	91% (169)	84% (157)
Crown & bridge work	55% (103)	71% (132)
Orthodontic removable appliances	55% (102)	70% (131)
Orthodontic fixed appliances	72% (133)	87% (162)
Orthodontic management of mixed dentition	37% (68)	65% (121)
Staff management	88% (163)	85% (159)
Employment law	87% (161)	89% (165)
Health & safety	79% (147)	84% (157)
Sedation techniques	32% (59)	52% (96)
Diagnosis and treatment planning	18% (33)	56% (105)

Table 4 A summary of the clinical fields perceived as being 'well' or 'very well' covered at undergraduate level

Clinical field	% VDP (n)	% VT trainer (n)
History taking & examination	97% (180)	93% (173)
Extraction techniques (non-surgical)	87% (162)	77% (144)
Management of continued bleeding	69% (128)	74% (138)
Management of red/ white patches	91% (169)	84% (157)
Drug prescribing and drug reactions	81% (150)	79% (147)
CPD	61% (113)	71% (132)
Restorative materials	97% (180)	97% (180)
Management of dentine hypersensitivity	92% (171)	92% (171)
Complete/Complete denture construction	94% (175)	88% (167)
Behaviour management in children	95% (176)	91% (170)
Non-surgical periodontal therapy	98% (183)	96% (174)
Diagnosis and treatment planning	82% (153)	44% (81)

The results of this study confirm earlier research by Levine in 1992[6] that new graduates are satisfied with the level of undergraduate experience gained in the basic skills needed to cope with their first year in general practice. A difference in perception between the VDP and VT trainer can however exist, and this is particularly noticeable in the groups' different perceptions regarding preparedness for diagnosis and treatment planning. It could be suggested that, in general, the VDPs lack sufficient insight to be aware of their deficiencies in this area, whereas the experienced trainers notice it acutely.

It is common in general practice to encounter children requiring orthodontic treatment. The GDC's document *The First Five Years*[1] advises that *'the student should be able to apply the principles of orthodontics in practice and to recognise the limitations that exist in that situation. This involves the ability to carry-out diagnostic procedures, formulate treatment plans and relate them to comprehensive patient care'.* Although orthodontics is often considered to be a 'postgraduate' subject, it is evident from this study that a considerable proportion of VDPs and trainers surveyed considered undergraduate orthodontic training as inadequate for treatment but reasonable for case assessment.

That document[1] also recommends that students *'should be able to undertake the extraction of teeth and removal of roots where no major complications are anticipated'.* It is clear from the results that the majority of VDPs and VT trainers surveyed believe new graduates need more clinical experience with regards to transalveolar (surgical) extraction of teeth. This perceived lack of undergraduate experience in orthodontics and surgical extractions has been highlighted by previous studies.[3-7] Similarly, the results of the current study are also consistent with previous studies, which have shown newly qualified dentists to be lacking confidence with crown and bridgework and complex endodontics.[5,8] It is clear that, despite the passage of time, these issues are still to be adequately addressed. Bartlett *et al.*[7] suggested in 2001 that this lack of clinical experience may be due to dental schools taking the attitude that confidence in all these skills are more effectively developed in general practice, and therefore have concentrated on providing a basic understanding of the principles alone. Although this may be the case, the GDC's *The First Five Years*[1] is fairly unambiguous in the competencies it would expect a new graduate to have obtained from a 'sufficient' dental school.

Other, non-clinical, areas where VDPs felt under-prepared relate to practice management skills and clinical governance. This finding reinforces the suggestion by Meadows *et al.* in 1998[9] that there is a need for dental education to address the wider role and responsibilities of the dentist.

Some aspects of the curriculum do not appear to have responded to changes in clinical practice or patient expectations, such as tooth whitening techniques, and it is worth recording that curricula should be sufficiently flexible to develop and reflect developments in

Table 5 Range of responses from VDPs				
Preparation during undergraduate training	**Very well covered**	**Well covered**	**Poorly covered**	**Very poorly covered**
History taking	82	98	6	0
Diagnosis & treatment planning	43	110	33	0
Extraction techniques (non-surgical)	64	98	23	1
Surgical extractions	6	37	119	24
Surgical endodontics	1	33	122	30
Drug prescribing and drug reactions	47	103	34	2
Orthodontic removable appliances	6	78	85	17
Orthodontic fixed appliances	11	42	113	20
Management of the mixed dentition	14	104	56	12
Staff management	1	22	136	27
Employment law	0	25	119	42
CPD	20	93	60	13
Health and safety	6	33	112	35
Complex/molar endodontics	8	50	122	6
Crown & bridge	16	67	98	5
Tooth whitening	1	16	122	47
Restorative materials	113	67	6	0
Dentine hypersensitivity	69	102	13	2
Complete/Complete denture construction	55	120	8	3
Non-surgical therapy	128	55	3	0
Sedation techniques	42	85	57	2
Behaviour management in children	110	66	9	1

clinical practice based on scientific evidence.

The perceived deficiency of these undergraduate courses to adequately prepare the responding new graduates to perform some forms of treatment (eg surgical endodontics) may reflect the recognition within teaching hospitals that not all procedures are appropriate for newly qualified practitioners. The presence of several dental specialties in the UK with appropriate training programmes allows a continuum of training and there is a tendency for some procedures, formerly performed routinely in general practice, to be seen increasingly as 'specialist' in nature.

The findings of this study do not imply criticism of any undergraduate course, but draw attention to areas where dental schools may want to examine the adequacy of their training. The increase in undergraduate student numbers for most dental schools that commenced in 2005, coupled with a difficulty in recruiting or retaining academic staff,[10] may make this task difficult to achieve. The 'Walport Report'[11] may address the recruitment of highly competent academic researcher/clinicians, but this may not result in recruiting and retaining clinical teachers in dentistry, where career progress is often based on research excellence but the main role is delivering chairside tuition. This is unfortunate as it is the number of teachers that currently requires expansion.

The graduates' preparedness should be monitored over the next few years. Not only will the graduates of 2010/2011 be directly affected, but as the increased numbers of students feed through the system there is a risk that existing cohorts will receive less close supervision during their clinical undergraduate training. The results of the current study suggest that there are difficulties providing sufficient clinical experience and teaching time during the undergraduate course, so the role of vocational training is becoming increasingly important.

There is agreement, and an acceptance, among trainers that VDPs have different training needs and there should be an initial interview to target and identify areas of perceived clinical weakness. Targeted training can then take place during the VT period. In some clinical areas, particulary endodontics and bridgework, current undergraduate teaching may not include what is normal practice in the primary care setting. Vocational training builds skills on top of the basic knowledge of undergraduates in many clinical areas as the VDP's confidence develops throughout the year with the guidance and support of the trainer.

Hobson in 1998[12] discussed how vocational training has formalised and improved training given to new graduates. It is also clear that vocational trainers make an important contribution to dental education, as it is they that can provide one-to-one teaching in clinical areas where new graduates are deficient.

Table 6 Range of responses from VT trainers

Preparation during undergraduate traning	Very well covered	Well covered	Poorly covered	Very poorly covered
History taking	68	105	13	0
Diagnosis & treatment planning	10	71	104	1
Extraction techniques (non-surgical)	23	121	42	0
Surgical extractions	4	27	122	33
Surgical endodontics	3	27	120	36
Drug prescribing and drug reactions	32	115	36	3
Orthodontic removable appliances	2	53	116	15
Orthodontic fixed appliances	1	23	130	32
Management of the mixed dentition	8	57	110	11
Staff management	3	24	133	26
Employment law	5	16	128	37
CPD	11	121	44	10
Health and safety	2	27	113	44
Complex/molar endodontics	20	28	122	16
Crown & bridge	10	44	116	16
Tooth whitening	2	27	135	22
Restorative materials	89	91	6	0
Dentine hypersensitivity	31	140	15	0
Complete/Complete denture construction	43	124	15	4
Non-surgical therapy	77	102	7	0
Sedation techniques	13	77	87	9
Behaviour management in children	66	104	15	1

"... it is important that dental schools communicate with VT organisers regularly, as feedback is essential to improving dental undergraduate education in the future."

Thus, it is important that dental schools communicate with VT organisers regularly, as feedback is essential to improving dental undergraduate education in the future. One previous recommendation has been for VT liaison officers to be integrated into undergraduate dental school strategy and planning[13] and the results of the current study suggest that this should become standard practice.

CONCLUSIONS

1. The results of this study were obtained from a self-selected sample and therefore the results cannot be generalised to new graduates nationwide.

2. Newly qualified dentists perceive a lack of training in their undergraduate course that would enable them to fulfil certain competencies (molar endodontics, surgical extractions, orthodontics and crown and bridgework) stipulated by the GDC.

3. Where present, these deficiencies should be targeted during their vocational training.

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1. General Dental Council. *The first five years: the undergraduate dental curriculum.* 2nd ed. London: General Dental Council, 2002.
2. Cabot L B, Radford D R. Are graduates as good as they used to be? *Br Dent J* 1999; **186:** 318-319.
3. Murray F J, Blinkhorn A S, Bulman J. An assessment of the views held by recent graduates on their undergraduate course. *Eur J Dent Educ* 1999; **3:** 3-9.
4. Silversin J B, Shafer S M, Smales F C, Sheiham A. British dentists' and final year British and United States students' opinions about their undergraduate training. *Br Dent J* 1974; **137:** 161-168.
5. Kay E J, Blinkhorn A S. Scottish dental students' views on their undergraduate training. *Br Dent J* 1987; **162:** 317-319.
6. Levine R S. Experience, skill and knowledge gained by newly qualified dentists during their first year in general practice. *Br Dent J* 1992; **172:** 97-102.
7. Bartlett D W, Coward P Y, Wilson R, Goodsman D, Darby J. Experiences and perceptions of vocational training reported by the 1999 cohort of vocational dental practitioners and their trainers in England and Wales. *Br Dent J* 2001; **191:** 265-270.
8. Bookham D J. Vocational trainees' views of their undergraduate endodontic training and their vocational training experience. *Int Endod J* 1991; **24:** 178-186.
9. Meadows H, Ireland R, Bligh J. A survey examining the attitudes of general dental practitioners toward change in undergraduate dental education. *Br Dent J* 1998; **184:** 401-404.
10. *Clinical academic staffing levels in UK medical and dental schools.* London: Council of Heads of Medical Schools, 2004.
11. *Medically and dentally qualified staff. Recommendations for training the researchers and educators of the future.* (The Walport Report). London: The academic sub-committee of UKCRC and Modernising Medical Careers, 2005.
12. Hobson R. The competent graduate. *Br Dent J* 1998; **184:** 156.
13. *Guidance for vocational training.* London: Committee on Vocational Training for England and Wales, 1993.