

Task division between dentists and dental hygienists in Norway

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Abstract – Objective: The aim of the study was to investigate the attitudes among dentists and dental hygienists to the policy objective in Norway of delegating more dental work from dentists to dental hygienists. *Method:* A questionnaire was mailed to a random sample of 1111 dentists and 268 dental hygienists in 2005. The response rates were 45% (504) among the dentists and 42% (112) among the dental hygienists. The survey sought to explore any discrepancies between current and preferred mix of different work tasks, as well as attitudes to the idea of substituting dentists with dental hygienists for certain work tasks. Logistic regression was used to analyse how answers differed by respondent characteristics. Results: Dentists spent only half of their total working hours on complex dental services, i.e. tasks that only dentists are skilled to undertake. Nearly 40% of their time was spent on tasks that dental hygienists are qualified to perform; examinations, screening and basic treatments. Still, the mix of work tasks that dentists preferred would involve slight changes: on average only 2% points more complex treatment and 3-4%points less of those tasks that dental hygienists are permitted to provide. Seemingly contrary, as many as 60% of dentists answered that it was 'desirable to delegate' more tasks to dental hygienist. However, only 21% of the dentists agreed that dental hygienists should be the entry point for dental services. Dental hygienists would prefer to do relatively more basic treatments and fewer examinations and screening, and the vast majority among them supported the idea that they could be the entry point for dental services. *Conclusion:* The results suggest that there will not be major changes in the division of labour between dentists and dental hygienists in Norway, if dentists are to be held responsible for taking such initiatives. Although dentists agree that more of their current work could - in principle - be delegated to dental hygienists, they do not prefer to reduce much of their own current activity of those work tasks that dental hygienists are qualified to perform.

To ensure the delivery of health care in a most cost-effective way, it is essential that the various categories of work are performed by people with the appropriate qualifications. If complicated procedures are left to unqualified personnel, patients might be at risk. Conversely, if basic tasks are done by over-qualified personnel, efficiency will likely suffer. In the case of the dental service, cost-effectiveness could improve if dental hygienists did more of the work for which they are actually trained, such as examining and screening patients and performing basic forms of treatment (1–8).

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Dental hygienist may work as dentist *supplements* and/or dentist *substitutes*. The aim of the former, where dental hygienists complement or extend the range of procedures provided by the dentist, is to improve quality and availability of oral health care. As substitutes, the aim is to ease the pressure on dentists by letting dental hygienists take over some of their tasks, leaving dentists to concentrate on procedures only they are trained to perform (9). This would boost overall efficiency in the dental health care sector (10). However, even if substitution is the object of increasing the roles for personnel with lower skills in favour of the higher

skilled ones, it could result in service diversification rather than labour substitution (11).

In Norway, recent government reports have suggested a change in oral health care delivery in the direction of dental hygienists as dentist substitutes. A report from the Ministry of Health (12) states that it is 'desirable to divide tasks between dentists and dental hygienists to ensure the most effective use of resources'. A recent dental policy commission (13) argued that there is continued 'potential for change in the division of labour by appointing more dental hygienists in both public and private sector'. Another report from the Ministry of Health (14) recognizes 'an untapped potential that would make better use of dental hygienists' skills in first-line service, and in promoting health and preventive health care'. And with reference to 'today's assumed shortage of dentists, and the high prices observed for dental services', the Norwegian Competition Authority recommended letting dental hygienists do more work, as substitutes for dentists (15). Thus, the rationale behind these policy statements and suggestions rests on the idea that there is scope for efficiency gains in dental health care provision through some substitution of dentists with dental hygienists.

A characteristic feature of the Norwegian dental service is the strong involvement of the private sector. While dental care for the under 18 agegroup and some special-needs groups is publicly financed, most adult dental treatment is done privately. In 2004, 94% of all children and adolescents under 18 were registered at a publicly funded dental clinic (16). Adults, on the other hand, have to pay for necessary treatment at private clinics generally out of their own pocket as dental insurance is close to nonexistent (17). There are no laws regulating the geographic spread of private dental clinics, nor the fees they are allowed to charge. While the public sector experiences difficulties recruiting and retaining dentists, particularly in the peripheral regions (12), there is a high density of dentists in private clinics in the central regions of the country (18). In the peripheral regions where private clinics are scarce or nonexistent, adults may buy dental treatment in public clinics at fees set by the county. Survey data show that 78% of Norwegian adults visit a dentist or dental hygienist each year (19).

It takes 5 years to train a dentist. Dental hygienists until recently spent 2 years in training, but now sign up to a 3-year bachelor programme. About a 100 dentists and 50 dental hygienists graduate annually (12). Part-time employment is common among dental hygienists in general and dentists in private clinics. In 2002, the average dental hygienist worked the equivalent of 84% of a full-time job (12). A survey showed that 37% of private sector dentists worked part-time, and that many of them would like to work more (20). It would be reasonable to deduce from this that there appears to be a surplus of dentists in the private sector in central regions.

The dentist versus dental hygienist ratio for Norway as a whole was 5:1 in 2004, but varied widely among the 19 counties from 2:1 to 10:1, and between the public (3:1) and the private sector (8:1) (Statistics Norway). All dental professions - dentists, dental hygienists, dental technicians and dental secretaries - have their own authorization and are obliged to practice in accordance with the Health Personnel Act which states that 'Health personnel shall act in accordance with their professional qualifications, and assistance shall be obtain and patients shall be referred on to others if this is necessary and possible'. Dental hygienists are assumed to have the professional skills to decide if a patient has dental problems they themselves are not trained to treat, or indeed know how to treat. However, if a dental hygienist or other health personnel work in a team with a dentist, the Health Personnel Act requires the dentist to take all decisions of an odontological nature.

The Health Personnel Act came into force in 2001, replacing a law that gave dentists an exclusive right to perform dental treatment. In accordance with this earlier Act, if dental hygienists were to provide preventive care unsupervised by a dentist, they needed special authorization from the health authorities. The current Health Personnel Act thus increases professional independence of dental hygienists.

Even if Norwegian legislation now allows health personnel to practice independently in accordance with their professional qualifications, independent dental hygienist practices are rare. Attempts to address the division of labour between dentists and dental hygienists, for instance by letting dental hygienists act as the entry point to dental services, are likely to meet with opposition from dentists (21–23). Adams (24) points out that because jurisdiction claimed by various groups tends to overlap, or at least meet, there is frequent conflict between occupations over boundaries. Inter-professional conflict is most intense in areas with a competitive market for dental services and where dental hygienists' professional project aimed at expanding their status, scope of practice and independence has achieved some success. In areas where there is a shortage of oral health care providers, conflicts are less intense (24). In the Norwegian case, policy changes are likely to get a variable response from the two professional bodies involved. Response is also likely to vary according to geographical availability of dental care.

The aim of this article is to establish the extent to which dentists and dental hygienists in the public and private sectors in Norway would welcome or reject the proposed change in the division of work. Is it desirable in their opinion to delegate more tasks to dental hygienists? What are their views of an organization model in which dental hygienist provides the entry point to the dental service?

First, it is hypothesized that if the current composition of tasks does not match up with professional skills, both groups would prefer relatively more challenging tasks, simply because it would increase work satisfaction. Second, the higher the density of dentists in an area, the less willing are dentists to delegate tasks to dental hygienists, because there is too little demand for complex treatment to compensate loss of income. The third hypothesis is that dental hygienists would like to be the entry point to dental services, but dentists would disagree strongly – the more so in high-dentist density areas. The reasoning here should appeal to intuition: it is one thing for dentists to agree to delegate some procedures to a lesser skilled profession, another to hand over powers that come with being the entry point to dental services.

Method

Questionnaires were mailed to a random sample of 1111 dentists and 268 dental hygienists in April 2005. The samples were randomly selected among members of the Norwegian Dental Association (NDA) and the Norwegian Dental Hygienist Association (NDHA), of which 96% and 86% of all practising dentists and dental hygienists, respectively, are members. The dentist sample included 28% of all NDA registered members, while the dental hygienist sample included 43% of all registered NDHA members. The sample sizes were determined by Cochran's sample size formula and budget constrains (25). The questionnaires mailed to the dentists and dental hygienists were similar, except for the phrasing of a few questions where the word *dentist* appeared in the dentists' questionnaire and the word *dental hygienist* in the other. One reminder was sent with an option to fill out an electronic version of the questionnaires on the Internet. The reminder increased the respondent samples by 98 dentists and 38 dental hygienists, among whom 51 dentists and 16 dental hygienists filled their response online. No distinction was made between dental specialists and dentists in general practice.

A total of 504 dentists and 112 dental hygienists returned the questionnaire; response rates were therefore 45% and 42%, respectively. Despite the fact that less than half of the sample responded, there was no indication of systematic nonresponse bias. There were no significant discrepancies, neither in the sector of employment (private versus public) nor the place of residence, among the responding dentists and dental hygienists compared with information on members of the NDA and the NDHA. Nor were there significant differences in the gender-mix between responders and nonresponders.

Study variables

Work tasks were categorized into five types: examinations/screening; basic treatment; complex treatment; professional development and administration (see Table 1 for details describing the content of each category). The three clinical task categories were made with reference to WHOs main categories of dental treatment (low, moderate and high technology) (26); a Swedish study categorizing the main areas of dental procedures (27); a categorization of dental work used in a report from the Norwegian Board of Health (28) and specification posted by NDHA on its website of the work dental hygienists in Norway are educated to perform. Among the five different tasks specified: dental hygienists are not trained to perform any complex treatment. Respondents were first asked to estimate how much time they spent on each of the five tasks during the last year (in per cent), and to indicate which percentages they would prefer to spend if they had the opportunity to choose.

The second issue dealt with willingness to delegate tasks: 'Is it desirable to delegate all or parts of the tasks you (dentists in your clinic) currently conduct to a dental hygienist?' If so, they were asked to specify which tasks should be delegated. The third set of questions was designed

Dental task	Description
Examination/ screening	Taking/reviewing medical history Clinical examination Exposure and use of radiographs Making treatment proposals Making cost estimates Making dental impressions
Basic treatment	Preventive care and dental health promotion Local anaesthesia Plaque and calculus removal Basic treatment of periodontitis and gingivitis
Complex treatment	Fissure sealing Filling of milk teeth Temporary fillings Extraction of milk teeth Treatment with orthodontic plates Fillings Surgery Periodontal treatment Other orthodontic treatment Pulp and root canal treatment Prosthodontic treatment
Professional development	Attending courses Attending professional meetings and conferences
Administration	Patient administration Other administrative work

Table 1. Categorization and description of dental tasks

to elicit even stronger preferences for delegation. Respondents were asked what they thought about the following statement: 'All dental treatment should start by a dental hygienist who refers the patient to a dentist if the patient needs treatment only dentists are trained to give'.

Finally, the questionnaire asked for some background information, i.e. sex, age, place of residence, employment in public/private sector, work experience and place of education – domestic or abroad (see Table 2 for details on variables).

The survey instrument was developed in close collaboration with senior dentists representing a wide range of skills (clinical practice, administration and research). The questionnaires were pretested on a small group of dentists.

Analysis strategy

The material was analysed by frequency counts, means, SDs and cross tables. A one-sample *t*-test was used to detect significant differences between the current and preferred distribution of work tasks. Logistic regression (29–32) was used to analyse how the dentists' answers on willingness to delegate tasks, and attitudes towards dental hygienists being the entry point to dental services,

varied with different respondent characteristics such as sex, age, public/private sector, work in team with/without dental hygienists and dentist density in the county where they worked. The logistic regression analyses were validated by a split-half cross-validation procedure where a model was developed on one randomly drawn half of the sample and tested on the other half. To study the stability of the cross-validation, the procedure was repeated six times, taking new random subsamples (33). The internal validation procedure was sufficiently accurate to ensure that the same independent variables came out as statistically significant in each analysis. The statistical analysis program spss version 14.0 (SPSS Inc., Chicago, IL, USA) was used.

Results

The analysis included 478 dentists and 111 dental hygienists who reported their main employment as either in public or private sector. As the focus of the study concerned clinical practice, we excluded respondents working mainly in the nonclinical sector. This affected 26 dentists and one dental hygienist.

Table 2 shows a male-dominated dentist sample. Conversely, the dental hygienist sample only included one man. The average age of dentists and dental hygienists was 48 and 42, respectively. All but one dental hygienist worked in a team with a dentist, while 45% of the dentists worked in teams with dental hygienists. All dental hygienists were educated in Norway; 15% of the dentist sample was educated abroad.

There was a big difference in client profile depending on whether the dentists or dental hygienists worked in the public or private sector. On average both dentists and dental hygienists in the private sector spent the majority of their time at work attending to adult patients, 89% and 92%, respectively. Children and adolescents accounted for a considerable amount of the working time both of public sector dentists and dental hygienists, 74% and 89%, respectively.

The time spent on different tasks varied considerably both within and between groups. On average, dentists spent almost 40% of their working time conducting examinations, screening and basic procedures (see Table 3), i.e. work for which dental hygienists are also qualified. Dental hygienists in the public sector spent more time on examinations

			Mean (n)	
Variable	Specification or question/statement phrasing in the questionnaire	Values	Dentists	Dental hygienists
Sex	The respondent's sex	If male = 1, if female = 0	0.61 (478)	0.01 (111)
Age	The respondents age	Natural number >0	48 (470)	42 (111)
Sector	The respondents sector of employment	If public = 1, if private = 0	0.32 (478)	0.64 (111)
Team	If the dentist (dental hygienist) work in team with dental hygienist (dentist)	If in team = 1, else = 0	0.45 (463)	0.99 (109)
Education	Place of dentist (dental hygienist) education	If $abroad = 1$, if domestic = 0	0.15 (472)	0.0 (110)
Dentist density	Number of man-labour years performed by dentists (dental hygienists) in 2004 per 10 000 inhabitants on county level	Real number >0	8.0 (19)	1.4 (19)
Delegation	'Is it desirable to delegate all or parts of the tasks you (dentists in your clinic) currently conduct to a dental hygienist?'	If yes = 1, if no = 0	0.60 (453)	0.55 (108)
DH_Entry	'All dental treatment should start by a dental hygienist who refers the patient to a dentist if the patient needs treatment only dentists are trained to give'	If agree = 1, else = 0	0.21 (463)	0.79 (110)

Table 2. Variable description

Definition, possible values, means and sample size. Dentists and dental hygienists.

Table 3. Current tasks conducted by dentists and dental hygienists in public and private sector

	Dentists		Dental hygienists		
	Public, <i>n</i> = 129	Private, n = 280	Public, <i>n</i> = 64	Private, n = 37	
Examination/ screening	11 (10)	13 (9)	48 (22)	33 (26)	
Basic treatment	27 (17)	24 (14)	36 (18)	52 (24)	
Complex treatment	47 (20)	53 (19)	2 (8)	7 (17)	
Professional development	4 (3)	4 (4)	4 (4)	3 (4)	
Administration	10 (15)	6 (5)	9 (7)	6 (7)	

Mean working time in per cent and (SD) in 2004.

and screening than private sector hygienists. The latter, however, were more likely to offer basic treatment. Note that only half of the dentists' working hours were spent on complex treatment, i.e. work that *only* this profession is qualified to perform. The difference between the public sector (47%) and the private sector (53%) dentists was probably due to patient demographics, in that adults are more likely to need complex treatment than children. It is also worth noting that some dental hygienists seem to perform complex treatment even if they are not qualified to do so.

Table 4 gives the average difference between respondents' preferred and current distribution of the different tasks. Note first that in respect of nonclinical tasks (professional development and Table 4. Mean difference between preferred working time in percent and current working time in percent on different tasks in 2004, among dentists and dental hygienists in public and private sector

	Dentists		Dental hygienists		
	Public, n = 117 (%)	Private, n = 233 (%)	Public, n = 51 (%)	Private, <i>n</i> = 28 (%)	
Examination/ screening	-1	-1*	-11*	-5	
Basic treatment	-3^{*}	-2^{*}	8^*	2	
Complex treatment	2	2^*	1	1	
Professional development	3*	2*	3*	4^*	
Administration	-3*	-1^{*}	-2^{*}	-3	

A positive number indicates preference for an increase, while a negative one indicates preference for reduction. **P*-value <0.01, of *t*-test testing if mean difference between preferred and current working time in percent differ from 0.

administration), which on average account for roughly 10% of total working time, all groups would prefer more professional development and less administration, and furthermore that the preferred increased time on professional development is outweighed by a similarly sized reduction in administration. Second, although dentists spend only half of their time doing work only they are qualified to do, there is no indication that they would prefer more time to spend on this. The dental hygienists, particularly in the public sector, wanted to carry out more basic treatments and spend less time on examinations and screening. Recalling our first hypothesis, the current composition of tasks performed by dentists does *not* match their professional skills. However, while they would like more challenging work, the preference is rather weak. Dentists would like to spend only 2% more time on complex treatments and professional development, and only 3–4% less on work that could be delegated to dental hygienists. Dental hygienists, however, expressed a stronger preference for more challenging tasks, in line with what the hypothesis would lead us to expect.

Asked whether they felt it was desirable to let dental hygienists do more of the work currently done by dentists, 57% of public sector dentists and 62% of private sector dentists thought so. The corresponding figures for public and private sector dental hygienists were 58% and 41%, respectively. Among the ones positive to delegation, more than 80% in both sectors and both professions felt that dental hygienists could do more examinations and screening while more than 90% felt they could provide more basic treatment.

Table 5 shows how dentists' responses to the question concerning delegation differed by respondent characteristics. The results show that the probability of answering 'yes' to more delegation, increased significantly if the dentist was educated abroad. It fell significantly with increasing age and increasing dentist density (as predicted by the second hypothesis), and if the dentist worked in the public sector. There was also a significant interaction effect between age and sector. Older dentists in the public sector were in other words more positive to delegation.

Task division between dentists and dental hygienists

On the statement that dental hygienists should be the entry point to dental services, a vast majority (79%) of dental hygienists thought so, but only 21% of the dentists - lending support to the third hypothesis. Table 6 shows how the probability of agreeing with this statement varied with respondent characteristics in the dentist sample. Consistent with what was hypothesized, the probability decreased significantly with increasing dentist density. Including age as a continuous variable had no significant effect, but when categorized using dummies in three evenly sized groups (under 40, 40–54, 55 and older), negative attitudes were significantly more likely in the age bracket 40–54. The probability of agreeing with the statement increased significantly if the dentist was already working in a team with a dental hygienist.

Discussion

In theory, it is more cost-effective to substitute dentists with lower paid dental hygienists to perform tasks for which both professions are qualified. This study shows that dentists on average spend only half of their time at work on complex dental procedures. Nearly 2 days a week are spent on tasks which dental hygienists are educated to perform, and which they potentially could do more cost-effectively. However, when asked about their preferences, the dentists only want to reduce the time spent on these tasks by a tenth (from the current 37–38% to 34% of total working time).

The majority of both dentists (60%) and dental hygienists (55%) agreed that dental hygienists could do more of the examinations, and screening

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	В		Odds ratio	95% KI for odds ratio		
Dependent variable: delegation		SE		Lower	Upper	
Sex (male = 1)	0.43	0.24	1.54	0.97	2.44	
Age	-0.06**	0.01	0.95	0.92	0.97	
Sector (public = 1)	-2.18^{*}	0.91	0.11	0.02	0.67	
Age × sector	0.04^{*}	0.02	1.04	1.00	1.08	
Team (if in team $= 1$)	0.19	0.25	1.21	0.74	1.98	
Education (if from $abroad = 1$)	0.82^{**}	0.32	2.26	1.22	4.20	
Dentist density	-0.16^{*}	0.07	0.85	0.74	0.98	
Constant	4.15	0.92	63.22			

Table 5. 'Is it desirable to delegate all or parts of the tasks you currently conduct to a dental hygienist?'

Logistic regression analysis to study how responding dentists' answers differed by different respondent characteristics, n = 441.

 $R^2 = 0.07$ (Cox and Snell), 0.09 (Nagelkerke), $\chi^2(7) = 31.33$, P < 0.001.

Percentage correctly predicted: 64.6%.

 $^{**}P \le 0.01, ^{*}P \le 0.05.$

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				95% KI for odds ratio	
Dependent variable: DH_Entry	В	SE	Odds ratio	Lower	Upper
Sex (male = 1)	-0.17	0.23	0.84	0.54	1.31
Age dummy 1 (=1 if 40–54 years old)	-0.54^{*}	0.25	0.59	0.36	0.95
Age dummy 2 (=1 if 55 years and older)	-0.44	0.27	0.64	0.38	1.10
Sector (public = 1)	0.44	0.26	1.55	0.93	2.58
Team (if in team = 1)	0.48^{*}	0.24	1.62	1.02	2.57
Dentist density	-0.21**	0.07	0.81	0.71	0.93
Constant	2.05	0.65	7.76		

Table 6. 'All dental treatment should start by a dental hygienist who refers the patient to a dentist if the patient needs treatment only dentists are trained to give'

Logistic regression analysis used to study how dentists' answers differed by respondent characteristics, n = 447. $R^2 = 0.07$ (Cox and Snell), 0.1 (Nagelkerke), $\chi^2(7) = 34.31$, P < 0.001.

Percentage correctly predicted: 61.7%. ** $P \le 0.01$, * $P \le 0.05$.

and basic treatments currently performed by dentists. This suggests a willingness among oral health personnel to substitute dentists with dental hygienists, which has to be good news for the Norwegian health authorities, having recommended the idea. Again, the preferred mix of tasks reveals that dentists are only prepared to part with a very small fraction of these tasks.

Dentists were not consistently willing to delegate tasks to dental hygienists. As hypothesized, dentists in high-dentist density areas were less prepared to do so than dentists in low-dentist density areas. Dentists in high dentist density areas would probably risk loss of income if they delegated work to dental hygienists. The result indicates that dentists in the central regions, with the most competitive market for dental services, will oppose attempts to change the balance of responsibilities. Compared with younger dentists in the private sector, older dentists in the public sector were more positive to delegation which might reflect greater confidence from personal experience of dental hygienists' competence over time. Dentists educated abroad are more likely to go along with the idea of more delegation than dentists trained in Norway. There is reason to believe that many of these dentists are foreigners who have been headhunted to fill vacancies in low-dentist density, high turnover areas. This might explain a more positive attitude among them towards dental hygienists.

The difference between respondents' preferred and actual time spent on different tasks could be indicative of a desire for change, or of the level of dissatisfaction with one's current combination of tasks. Contrary to what was hypothesized, the study indicates that dentists do not want to increase time spent on complex procedures, even though only they have the appropriate skills to perform these tasks. This could have several explanations. There may be too little demand for complex treatments, i.e. given the present supply of dentists there are, at least in central regions, simply not enough patients in need of complex treatment to make a living if noncomplex procedures are given to dental hygienists. Grytten and Dalen found excess capacity among private practitioners in Norway who provide most dental services for adults (34). Another study estimated that on average there are 1.31 h/year available for adults requiring dental care, and concluded that far from an undersupply, there is rather a surplus of dentists in Norway (20). An alternative reason dentists do not want to spend more time performing complex treatments than they currently do, is that there is no difference in hourly wage for the dentists whether they conduct complex treatment or other clinical dental services. This would be the case for salaried dentists, who are commonly found in the public sector in Norway. It could also reflect a preference for task variation, i.e. a balance between relaxing and demanding work, resulting in higher job satisfaction than a day filled with complex treatment challenges.

The results revealed that some dental hygienists seem to perform complex treatment even if they are not qualified to do so. The dental hygienists in question might be experienced hygienists who have been delegated such tasks under the supervision of dentists. It might, alternatively, reflect a misclassification of tasks - in that they perceive some basic tasks to be 'complex' - but not in line with the classification made in this study of 'complex treatments'.

Not surprisingly, the idea of letting dental hygienists act as first-line gate-keepers was supported by only 21% of the dentists, as opposed to nearly four times that share among the dental hygienists (79%). In other words, while the majority of dentists might be prepared to hand over some of the least demanding tasks, they are not willing to relinquish the power to decide which patients should be treated by which profession. Delegating power is clearly a more serious kind of delegation than handing over certain responsibilities.

Low response rate is a common problem in sample studies, not least for the generalizability of the findings (35). With our response rates of <50%, one should therefore be cautious about generalizing these findings to all Norwegian dentists and dental hygienists. That said, there is no indication of systematic differences between responders and nonresponders in terms of gender, sector of employment or place of residence.

The respondents' estimated time spent on different tasks during the year prior to the data collection. Distance in time could cause a recall bias. A more accurate, though much more resource intensive, type of data collection would be to observe and record the actual time spent on the different tasks.

Compared with other European countries, the Nordic countries have relatively more dental hygienists per dentist (6, 36). However, Norway has relatively fewer dental hygienists per dentist than the other Nordic countries, and considerably fewer than Canada, Japan and the United States, where there is almost one dental hygienist per dentist (6, 36). The dental hygienists in Norway and other countries seem in general to have a status as dental auxiliary. In Canada, United States and Japan dental hygienists appear to have a more independent professional role.

The potential for substituting dentists with dental hygienists is highest in the private sector, where the 2004 dentist versus dental hygienist ratio was 8:1. Based on an assumed shortage of dentists, the Norwegian Competition Authority recommends greater use of dental hygienists. Whether there is a shortage of dentists in Norway is an on-going debate, and the answer probably is more political than mathematical (18, 37). However, while there is disagreement on the need for more dentists in the country as a whole, there is agreement on the facts: that there are relatively fewer dentists in the peripheral regions than in the central regions and that this regional disparity is strongest in the private sector.

Task division between dentists and dental hygienists

Given the results of this study on prevailing attitudes within the dental profession, we will probably not be seeing major changes in the division of tasks between dentists and dental hygienists in the foreseeable future. Dentists' attitudes may reflect excess capacity in the private sector in central regions. Substitution could, however, be possible if the demand for services provided by dental hygienists grows in the adult population. Adults are mainly catered for in the private sector. They constitute a larger group than children and adolescents, and a more diverse dental symptomatology. An increasing number of adults have good dental health, and can make do with regular examinations and basic treatment. Some, of course, need more complex treatment. In most cases adults pay their own dental bills. This gives them consumer power to alter the division of labour between dentists and dental hygienists - if that is what they want. Preferences may change if more dental hygienists establish independent practices, which can make the dental hygienist a possible first stop for dental services. Interestingly, our data seem to suggest an apparent contradiction; while dental hygienists wish to operate as the entry point for dental services, they would prefer to do less examinations and screening than at present. If dental hygienists really aspire to being the entry point for dental services, they will need to rethink their position. Another thing is that the expanded dental hygienist education may result in a salary creep for this group, undermining the cost argument for substituting dentists with dental hygienists.

The survey method used in this study does not tell us much about the *reasons* dentists and dental hygienists respond in the way they do. Future research should contemplate the use of focus groups for this purpose. It would tell us more about issues like financial incentives and trust/ distrust between professions.

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