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Financial systems' impact on dental care; a review of fee-for-service and capitation systems

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Objective This review covers the impact of financial systems on dental care. ***Background*** Remuneration in fee-for-service (FFS) is done per service provided and in capitation (CAP) per patient enrolled. It may be expected that dentists' incentive in CAP is to keep the number of services provided at a minimum, while in FFS it is to keep the number of services at a maximum. This should lead to a different impact on care, with the dentists in CAP focusing more on prevention and dentists in FFS more on restorative treatment. Six questions were put: Does CAP increase or decrease caries incidence? Does CAP increase or decrease restorative treatments? Does CAP increase preventive care? Does CAP increase or decrease productivity? Does CAP increase or decrease the dentist's satisfaction with his/her work? Does CAP increase or decrease the patients' satisfaction with the oral care provided? ***Methods*** Literature was obtained through searches in databases. A format was developed to define the literature of interest. ***Results*** CAP decreases restorative treatment and there is a tendency of decreased caries incidence. "Supervised neglect" cannot be established. CAP increases preventive care. A conclusion regarding productivity was not possible. The results on dentist's satisfaction with work were inconclusive, as were the results regarding patient satisfaction. ***Conclusions*** CAP has a different impact on provided care than FFS. More research is needed in this area and focus on efficiency is of importance. This review was funded by the Swedish Research Council.

Key words: Capitation, caries incidence, preventive treatment, productivity, restorative treatment, satisfaction

Introduction

There are at least three aspects to dental financing. It refers to the way in which the dentists are paid for their work, the way in which patients pay for their dental services and the insurance system in itself. The focus of this review is the first of these aspects.

Besides salary, there are basically two other methods of paying dentists, fee-for-service (FFS), and capitation (CAP). FFS payment is per unit of work and CAP means that the dentist is paid per patient enrolled (Eastaugh, 1992). A dentist paid by salary earns a fixed amount of money regardless of the number of patients treated. There is thus no monetary incentive to increase the number of patients. Dentists working in CAP and FFS, on the other hand, have such a monetary incentive. In addition, FFS dentists have the incentive to perform as many procedures as possible, while CAP dentists have the incentive to perform as few as possible. A basic hypothesis is that this leads to different working styles, with CAP dentists focusing more on prevention. The aim of this review was to find evidence if FFS and CAP have different impact on:

- Outcome of care: number of examinations, restorative and preventive care procedures
  - Restorative care: number of filled teeth and other restorative treatments
  - Preventive care: prophylactic work, information and instructions to patients on oral hygiene, control of dental disease, dietary advice, fluoride prescriptions and fissure sealants
- Productivity: the number of procedures, or patients, per time unit
- Satisfaction with work: dentists' satisfaction with work and working conditions.
- Satisfaction with provided oral care: patients' satisfaction with dentist and dental care

Six questions were formulated:

1. Does CAP increase or decrease caries incidence?
2. Does CAP increase or decrease restorative treatments?
3. Does CAP increase the preventive care?
4. Does CAP increase or decrease productivity?
5. Does CAP increase or decrease the dentist's satisfaction with his/her work?
6. Does CAP increase or decrease the patients' satisfaction with the oral care provided?

Method

The search strategy

Literature was identified using searches in 12 databases. Complete lists of databases, their given time periods and search terms used are found in Table 1. The inclusion criteria were the search terms and the exclusion criteria were "financial system not being the focus of the articles" and "articles without abstract". No restriction in time period was made. However, a cut off regarding

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Table 1. Cross table of generated literature from searches in databases. Number of relevant hits in bold and total number of hits in brackets.

	Database											
Searchterm	*ELIN@lund (1950-)*	*PsycInfo (1840-)*	*ERIC (1966-)*	*EconLit (1969-)*	*Sociological Abstracts (1963-)*	*SweMed+ (1977-)*	*CINAHL (1982-)*	*Health and Safety Science Abstracts (1981-)*	*Social Sciences Citation Index (1956-) and Science Citation Index Expanded (1945-)*	*POPLINE (1970-)*	*LOCATOR plus (1995-)*	*PubMed (1966-)*
Capitation	- (1581)	**1** (157)	0 (43)	0 (103)	0 (33)	**2** (5)	- (811)	**1** (3)	- (981)	0 (13)	0 (167)	- (4177)
Capitation fee	0 (24)	0 (4)	0 (2)	0 (17)	0 (12)	**2** (3)	- (515)	0 (2)	0 (52)	-	- (866)	- (3692)
Capitation and preventive care	0 (11)	-	-	0 (1)	0 (2)	-	0 (27)	-	**1** (9)	-	0 (1)	**9** (84)
Capitation and communication	0 (13)	-	0 (1)	-	-	-	0 (23)	-	0 (6)	-	-	**1** (273)
Capitation and managed care	- (689)	0 (48)	0 (1)	0 (7)	0 (2)	-	- (503)	-	- (302)	-	0 (79)	- (2596)
Capitation and health maintenance	0 (220)	0 (11)	0 (2)	0 (2)	0 (6)	-	0 (149)	0 (1)	0 (101)	-	0 (13)	- (1087)
Capitation and doctors	0 (150)	0 (2)	-	0 (1)	0 (4)	-	0 (27)	0 (1)	0 (24)	-	0 (3)	- (351)
Capitation and care models	0 (1)	0 (16)	-	0 (6)	0 (1)	-	0 (1)	-	0 (1)	-	-	- (432)
Capitation and attitudes	0 (15)	0 (4)	-	-	0 (2)	0 (1)	**1** (32)	-	0 (15)	-	0 (1)	**2** (144)
Capitation and patient self care	0 (1)	0 (1)	-	-	0 (1)	-	0 (2)	-	0 (1)	-	-	0 (6)
Capitation and patient centered care	-	-	-	-	0 (1)	-	0 (12)	-	-	-	-	0 (14)
Capitation and managed care programs and patient centered care	-	-	-	-	-	-	0 (6)	-	-	-	-	0 (10)
Capitation and dentistry	0 (2)	**1** (1)	0 (5)	-	-	**2** (2)	0 (7)	-	**1** (9)	-	-	**17** (144)
Capitation and dentists	0 (8)	-	-	-	-	**2** (2)	**1** (7)	**1** (1)	**6** (19)	-	0 (1)	**13** (59)
Nr. of articles generated from more than one search term	-	**1**	-	-	-	**2**	**1**	**1**	**1**	-	-	**14**
Total nr. of articles used	-	**1**	-	-	-	**2**	**1**	**1**	**7**	-	-	**19**

generated hits was made. A search term generating more than 300 hits was considered too wide, and therefore a refined search term was used to try to narrow down the number of hits. In all, 2,507 articles were scrutinized. However, some 20 percent of these were multiples appearing in different search terms and in different databases. Further articles were found in the references of the collected literature.

Developing the format

Using the guidelines proposed by The Cochrane Reviewers' Handbook 4.2.0. (2003), a format for analysis of the literature was developed.

First, a definition of participants was made. The condition of interest in this review was the two financial systems FFS and CAP. The populations of interest were therefore caregivers and patients in these two systems.

The second step was a definition of type of comparison. The type of comparison of interest was between participants in FFS and CAP, i.e. both dentists and patients.

The third step was the definition of the type of outcome of interest, which were outcome of care, productivity, satisfaction with work, and satisfaction with provided oral care, as defined in the introduction.

The last step was the definition of study designs of interest, which were observational studies including examinations, patient records, and/or interviews with patients and/or caregivers. These studies should preferably be parallel study designs comparing populations from the two financial systems. The developed format was used as a guide, but some exceptions had to be made to explore all questions.

The gathered material was compiled into eight areas: reference to article, type of study, aims, population, method, outcome variables, results and conclusions. The compilations are presented in Tables 2, 3 and 4.

Results

Caries incidence and restorative treatments

A study was conducted in a trial of a CAP system for children in Great Britain 1986 to -89. The study involved four matched pairs of Health Service administrative areas; four control areas with FFS remuneration system, and four trial areas where CAP was implemented. One matched pair was located in Scotland, the rest in England (Coventry *et al*., 1989). The results from the study have also been reported elsewhere (Holloway *et al*., 1990; Lennon *et al*., 1990; Mellor *et al*., 1990). In the trial, a temptation to underprescribe dental treatments in CAP was found. In FFS there was an opposite tendency, but it was not as strong as in CAP. There was no evidence of systematic neglect of CAP patients, but they had fewer fillings and more decayed teeth than FFS patients. Data on caries progression were, however, only collected for dentine caries. Statistical tests were only applied within the matched pairs, and a significant difference between filled and decayed teeth was only found in one pair (Holloway *et al*., 1990).

Mellor and Lennon's (1993) study of examination frequency between 1987 and 1988 showed a slightly higher examination frequency for FFS than for CAP children.

Another research group, mainly consisting of the same researchers as in the CAP trial, studied three of the four control areas in the trial after CAP had been implemented in dentistry for children and adolescents (Blinkhorn *et al*., 1996). These results have also been reported elsewhere (Holloway *et al*., 1997; Mellor *et al*., 1997). One part of this study was comparative over time on clinical notes about number of examinations, visits, fillings, and extractions. The mean numbers of all those outcomes had decreased after the implementation of CAP. The only non-significant outcome was the number of extractions in the age group 6-12 years in one area (Mellor *et al*., 1997). A reduction in caries prevalence was also found among 14-15-year-olds (Holloway *et al*., 1997).

In a CAP trial in Akershus, Norway, Wang *et al* (2001) studied children 5, 12 and 18 years old. They found no signs of "supervised neglect", i.e. not dealing with the problem but keeping the patient free from pain, concerning approximal caries lesions. There were no significant differences between CAP and FFS patients, with 17% of the caries lesions being restored in CAP and 18% in FFS. However, the trial encompassed only four months.

In a CAP trial of adults over 20 years old in Gothenburg, Sweden, Zickert *et al* (2000) found that the need for restorative care in CAP was mainly due to fractures and defects in previous restorations. A separate control examination performed on the 118 patients included in CAP during six years, revealed that caries was the cause of only 33% of all restorations performed on these patients.

A study of practices with a Dual-choice Dental Plan in the United States by Atchison and Schoen (1990) showed that CAP patients received fewer services, and visited the dentist less often than FFS patients. The study was performed on clinical records and encompassed both adults and children. However, the authors found the documentation of oral examinations, diagnoses and treatment plans to be unsatisfactory.

There is a lack of information on filling materials commonly used in CAP and FFS. Only two of the reviewed studies mention types of filling materials. A study on CAP- and FFS dental benefit plans for subscribers and their families in the United States by Beazoglou *et al* (1988) only mentions a utilization rate of one- and two surface amalgam fillings, while Mellor *et al* (1997) account for distribution of different filling materials; 71% amalgam, 22% composite, and 7% glass-ionomer fillings.

Information is also scarce regarding other restorative treatments, such as endodontics and prosthodontics. Mellor and Holloway (1991) are the only ones mentioning endodontics, listing it as covered by the new CAP system. Orthodontics and items that involve laboratory fees, such as crowns and dentures, were not covered by CAP.

In Sweden, only half the cost for the dental technician's work for prosthodontics was included in CAP. The other half of the dental technician's work and the casting material was paid by FFS (Zickert *et al*., 2000).

There are only two articles providing any data on prosthodontics; Beazoglou *et al* (1988) rating utilization of different types of crowns, bridges and partial dentures per 100 subscribers, and Atchison and Schoen (1990)

Table 2. Studies comparing FFS and CAP

Ref.	*Type of Study*	*Aims*	*Population*		*Method*	*Outcome Variables*	*Results*	*Conclusions*
			FFS	*CAP*				
Beazoglou *et al.*, 1988	Empirical comparative study	Effect	43 practices, 55 dentists	1 practice, 5 dentists	Utilization records	Prophylaxis, patterns of treatment	Less preventive measures and more one surface restorations in CAP	CAP compensates for low copayments with less costly measures
Coventry *et al.*, 1989	Controlled comparative clinical trial	Process, effect	171 practices, 366 dentists. 952 14-15-year-olds, 949 5-6-year-olds	183 practices, 322 dentists. 967 14-15-year-olds, 989 5-6-year-olds	Examinations of patients, questionnaires to parents and dentists, structured interviews with representatives of the GDSC	Caries prevalence and experience, fissure sealants, satisfaction (dentist, parents, administration) prevention, visits, examinations	Caries prevalence similar in all areas, except one. More decayed teeth, fewer filled and less sealants in CAP	CAP little influence on dental health compared with FFS in trial
Holloway *et al.*, 1990	Controlled comparative clinical trial	Process, effect	952 14-15-year-olds, 949 5-6-year-olds. 99 dentists.	967 14-15-year-olds, 989 5-6-year-olds. 99 dentists.	Clinical examinations, dental record data	Caries prevalence and experience, patterns of treatment	Caries experience and percentage of missing teeth similar in FFS and CAP	Different treatment philosophy in CAP
Atchison and Schoen, 1990	Comparative evaluation	Process, effect	5 practices, 242 patients	6 practices, 253 patients	Examinations of structure and process, interviews, dental records	Structure and process	Neither system met criteria for good dental practice or process of care. Mean of 11.40 services in FFS and 6.36 in CAP	Undertreatment in CAP and overtreatment in FFS
Mellor and Lennon, 1993	Retrospective comparative study	Process, effect	99 dentists	99 dentists	Dental record data	Frequency of clinical examination, area, age of child, dentist	The patients' age, payment system and the dentist influenced examination frequency	The largest variation was between dentists working under the same payment system
Blinkhorn *et al.*, 1996	Comparative over time on age group 14-15 years old. New study on age group 7-8.	Effect	718 patients 14-15-years-old in 1989	949 patients 14-15 years old, 999 patients 7-8 years old in 1994.	Random samples of clinical examinations Data collection forms	Prevalence of caries, patterns of treatment, preventive care, visits and examinations	Reduction in caries, visits and examinations. Increase in fissure sealants and preventive advice	Quality of care in CAP of high standard. Different philosophy for permanent teeth than deciduous dentition.

Table 2 continued over...

Table 2. *Continued...*

Ref.	*Type of Study*	*Aims*	*Population*		*Method*	*Outcome Variables*	*Results*	*Conclusions*
			FFS	*CAP*				
Holloway *et al.*, 1997	Comparative over time on age group 14-15 years old. New study on age group 7-8.	Effect	459 patients 14-15 years old in 1989	891 patients 14-15 years old, 908 patients 7-8 years old in 1994	Random samples of clinical examinations	Prevalence of caries and patterns of treatment	7-8-years-olds: presence of decayed primary teeth	Quality of care for permanent dentitions in CAP of acceptable standard
Mellor *et al.*, 1997	Comparative over time	Effect	75 dentists, 4 494 patients in 1987/88	73 dentists, 4 250 patients in 1992/93	Data collection forms	Patterns of treatment, preventive advice, examinations and visits	Decrease in radiographs. Increase in fissure sealants	Less diagnostic and operative treatment in CAP. Slightly more prevention
Hassall and Holloway, 1998	Comparative over time	Effect	459 patients in 1989	891 patients in 1994	Clinical examinations	Caries prevalence, fillings, extractions, fissure sealants	Slight increase in caries. Number of extractions low	Seems to be a change to less invasive restorative procedures in CAP
Lennon *et al.*, 1990	Controlled comparative clinical trial	Process, effect	1118 5-6-year-olds and 1347 14-15-year-olds examined, 4514 parents and 455 dentists completed questionnaires*		Examinations, questionnaires, dental record data	Preventive style and increased level of parental knowledge	Higher levels of oral hygiene instructions and dietary advice in CAP	Prevention in CAP might have positive influence on children's dental health
Mellor *et al.*, 1990	Controlled comparative clinical trial	Process	Participating dentists, 2 representatives from each local dental committee in CAP areas, chairman and 2 members of the GDSC of the BDA*		Questionnaires and interviews	Satisfaction with financial system	More administrative problems	The study allowed for definition of problems in the CAP model

* Proportions of CAP and FFS not specified

Table 3. Capitation studies

Ref.	*Type of Study*	*Aims*	*Population CAP*	*Method*	*Outcome Variables*	*Results*	*Conclusions*
Holloway and Clarkson, 1994	Evaluation	Process, effect	50 dentists	Telephone interviews, discussions, questionnaires	What preventive procedures found to be beneficial, and why	Dietary counselling, pit and fissure sealants and oral hygiene demonstrations most popular. Financial considerations affected prevention procedures less	These dentists had a different treatment philosophy in CAP
Zickert *et al*., 2000	Controlled comparative clinical trial	Effect, process	4 dentists, 4 dental hygienists, 6 dental nurses. 2 418 patients	Clinical examinations, questionnaires	Average disease activity, attitudes to model, average cost	Decreased disease activity. Positive attitudes. Lower costs in CAP	CAP encourages preventive thinking in patients
Wang *et al*., 2001	Clinical trial	Process, effect	3 dentists	Interviews, dental record data, radiographs	Caries prevalence, quality of treatment, working conditions, administration, productivity, economy	Small differences in quality of treatment. Increased administration	CAP might contribute to more patients receiving care

Table 4. Other studies

Ref.	*Type of Study*	*Aims*	*Population*	*Method*	*Outcome Variables*	*Results*	*Conclusions*
Nuttall and Pitts, 1989	Comparative evaluation	Process	926 GDS, 201 CDS	Questionnaire	Preferred remuneration system, scope of GDS treatment	Most preferred their current remuneration. Salary and FFS were most preferred	CAP remuneration was not found attractive
Newton and Gibbons, 1996	Comparative evaluation	Process	17 dentists in NHS, 11 in CAP	Interviews	Sources of stress, levels of stress, coping mechanisms	Sources of stress were patient management and time pressures. Not to think about work when home and exercise mostly used coping techniques	CAP had decreased dentists stress sources
Brown and Ruesch, 2000	Evaluation	Effect	1 017 dentists participating in CAP and PPO plans**	Questionnaire	Participation, history with dental plans, patients, effect of participation, characteristics of, and satisfaction with, largest plan	64.3% of the CAP-dentists had left a CAP plan at some point. PPO and CAP had positive impact on practice	Majority of dentists had positive experience of these dental plans
Grytten *et al*., 2001‡	Evaluation	Process	49 dentists	Questionnaire	Preferred remuneration systems and ideas about CAP	Connection between working conditions and wish to join CAP	The dentists wished for more flexible remunerations
Grytten *et al*., 2001‡	Trial	Effect	32 dentists	Method unknown	Number of extra patients treated	Increased productivity	CAP might reduce the need for dentists

**Proportions of CAP and PPO not specified
‡ Note that both studies are from the same article

providing average number of planned treatments regarding crown and bridges and removable prosthodontics.

In sum, evidence suggests that CAP decreases restorative treatments, but this is less clear regarding caries prevalence. There were usually more decayed teeth among CAP patients, at least in a short time perspective, although there was little evidence to suggest systematic neglect in CAP. The explanation for fewer CAP treatments, that dentists await progress of preventive measures, was supported by long time data, where CAP had decreased the need for restorative care. Results regarding commonly used filling materials are mixed and a conclusion cannot be drawn.

Preventive care

In the CAP trial, it was found that preventive advice on control of dental disease was provided to a larger extent in CAP than FFS. There were also more prescriptions of fluoride supplements in CAP. The use of fissure sealants was low in both systems, except for Scotland where children in CAP received significantly more sealants than those in FFS. The results regarding preventive advice should be interpreted with caution, though, since the authors found that many dentists in both systems neglected to make notes on preventive advice given to their patients (Lennon *et al*., 1990).

After the implementation of CAP, an increased use of fissure sealants was found together with a reduction in caries prevalence (Holloway *et al*., 1997). A significant increase in preventive advice was also found, except for one area (Mellor *et al*., 1997). The restorative indices had fallen in all areas, but the increased use of fissure sealants balanced this fall to a large extent when included in the calculation (Hassall and Holloway, 1998).

In Sweden, all patients were given individually designed preventive programmes when entering CAP. The programmes included individual and basic information, both in writing and verbally, on how to prevent caries and periodontal disease by self-care. The average caries activity remained about the same during the years of the trial. However, the average periodontal disease activity, measured as number of gingival pockets six mm or larger, decreased. The authors credited the information programmes for turning the attitudes and behaviour patterns of the patients, leading to better oral health (Zickert *et al*., 2000).

Beazoglou *et al* (1988) had contradictory findings: FFS patients received more prophylaxis and fewer one-surface amalgam fillings than CAP patients. The authors argue that the fixed CAP reimbursement limits dentists when trying to meet the patients' dental needs; preventive services being economically difficult to provide together with restorative services.

In sum, CAP increased preventive advice and fissure sealants, although there was also some contradictory evidence.

Productivity

In Norway, the three participating dentists saw more patients, increasing their productivity with 18% during the CAP trial. The time of work spent per patient enrolled with the dentist was on average 0.71 hours for CAP patients and 1.10 hours for FFS patients (Wang *et al*., 2001).

A trial implementation of a mixed salary and CAP system in Østfold, Norway, is mentioned in the discussion in Grytten *et al*'s article (2001). When receiving a CAP sum per extra patient treated in addition to their first 1,360 patients, the participants together treated 4,950 more patients. This was the equivalent of the work of 3.64 dentists in a year.

Information regarding CAP and productivity is limited since the mentioned studies concern salary and CAP remuneration.

In sum, there is too little information to draw any conclusions regarding productivity, but it seems that productivity at least does not decrease with CAP.

Satisfaction with work

Before the previously mentioned CAP trial in Great Britain, a pilot study was undertaken. At the end of the pilot, the 50 participating dentists filled out a questionnaire. Of the participants, 26 experienced greater professional satisfaction in CAP, and preference to stay in CAP was expressed by as many as 40 of them (Coventry *et al*., 1986).

However, Nuttall and Pitts (1989) found in another study that only 22.6 % of the responding general dental practitioners (GDP's) would prefer a CAP system for children, and only 8.4% supported such a system for adults. The authors stated that the low number of positive responses concerning the children's system may not reflect lack of support regarding the idea of CAP per se, but rather of the particular CAP system for children tested in Britain at that moment.

Grytten *et al* (2001) found that "pure" CAP was not found to be very attractive among Norwegian dentists, but a mixture of fixed salary and CAP was preferred by most.

In the CAP trial in Sweden Zickert, *et al* (2000) found the dental hygienists initially being more positive to the system than the dentists. The latter became more positive with time, and eventually found it to be a possible dental care model for the future.

A survey among dentists participating in CAP- and Preferred Provider Organization (PPOs) dental plans in the U.S. by Brown and Ruesch (2000) found 54% of the CAP plan dentists to be very or somewhat dissatisfied with their largest CAP plan. The reason for this was primarily the fee, but another reason was concerns regarding limitation to provide the patients with sufficient care.

In Akershus, Norway, all dental care providers (dentists and dental nurses) participating in the trial were satisfied, and brought forth decreases in waiting time and effective use of work capacity as positive. They were all affected by an increase in work pace, however, and the authors concluded that this might be a strain on the personnel if CAP would be established (Wang *et al*., 2001).

In contrast, Newton and Gibbons (1996) found that dentists working in an independent CAP scheme in Great Britain reported having more time for their patients after converting from the National Health Service (NHS).

In the CAP trial in Britain, the dentists in CAP expressed a feeling of more clinical freedom than FFS dentists did, in all areas but one. The clinical freedom was not realized in practice, though. The FFS dentists were instead more innovative in their clinical practice, and were also more satisfied than CAP dentists with the quality of care given to patients (Mellor *et al*., 1990).

A study after the implementation of CAP found that dentists in CAP felt more satisfied seeing caries free children than restoring their teeth. They also felt that they were neglecting patients if not practicing prevention (Holloway and Clarkson, 1994).

In sum, a relationship between CAP and increased or decreased satisfaction with work was not possible to establish. No article made a comparative repeated study of dentist satisfaction, and information on satisfaction in CAP systems provided by the reviewed articles was inconclusive.

Patients' satisfaction with CAP systems

In the CAP trial in Britain it was found that parents to children in either system were satisfied with the preventive measures and the difference in satisfaction was negligible (Lennon *et al*., 1990).

In the Gothenburg trial, 98% of the participating patients claimed to prefer CAP before FFS (Zickert *et al*., 2000).

There is too little information regarding patients' satisfaction with CAP systems to draw any conclusion. At least it does not seem to decrease.

Discussion

Summarizing the findings from this review, CAP seems to foster a different treatment philosophy than FFS. Instead of indicating "supervised neglect", the review's inconclusive results regarding caries prevalence seem to indicate that preventive measures are given a chance to work before the ultimate step of restoration is taken.

Two things seem relevant for optimising CAP's influence on oral health. First of all, for CAP to be rewarding for both patient and dentist, the patient should preferably be dentally fit when enrolling. The system's economic limitation might otherwise force restorations to precede prevention. If so, it could lead to an increase in the CAP fee for the patient, or preventive services not being provided at all if treatment needs are extensive. Neither option is in the best interest for the patient or the caregiver.

Second, the preventive philosophy of CAP presupposes that the patient is willing to take care of his or her oral health by self-care prevention. The patient's willingness to adhere to preventive advice may be influenced by the patient's life situation. An individual information programme based on the patient's perceived ability to adhere to the advice might reduce the risk of the information not acted upon. As previously mentioned, the trial in Sweden credited the trial's success to the use of individual preventive programmes (Zickert *et al*., 2000).

The conclusion to be drawn from this review is that CAP has a different impact than FFS on provided care. A combination of preventive measures and enhanced knowledge on oral health by personalized information to each patient on oral hygiene, dietary advice and self-care instead of instant restorations, provides CAP with a potential to elicit and maintain good oral public health.

Limitations of the review

There are few comparative studies of CAP and FFS in dentistry, which of course limits the scope of this review. Several of the reviewed articles concern only two studies, conducted in the same areas of Great Britain, by mainly the same researchers. Their studies constitute also the only long-term repeated measures study. The lack of such studies of CAP and FFS in dentistry is surprising, since the pioneering comparative studies were published already in the 1970's (Cogan, 1975; Rosen *et al*., 1977; 1978; Schoen, 1973). In Sweden there was hot political debate on the issue, without leading to studies giving evidence. More long-term repeated measures studies are needed.

A further limitation is that most research available has focused on children and adolescents. Dental health of children and adolescents is not completely comparable to that of adults. Several dental problems rarely occur before adulthood, periodontal diseases being one example. To obtain knowledge about CAP's influence on different oral problems, more research on adult patients is needed.

The lack of information on actual forms of CAP remunerations in the studies limits the possibility of drawing conclusions. As claimed in the introduction, there are three basic methods of paying dentists: salary, CAP and FFS. There are, in practice, multiple payment methods, however these are mixed remuneration systems founded on the basic ones, such as salary with commission, for example.

In several of the studies there is also a conceptual unclarity, which is a further limitation. Dental care financing ought to be discussed from at least three viewpoints: patient payment, dentist remuneration, and insurance remuneration. The exact meaning is seldom clear in the reviewed studies; hence no binding conclusions can be drawn regarding the relation between financial systems and health. It seems essential that this conceptual unclarity should be improved in future research.

Future research

The results from this review point to the necessity of further research in the area of CAP. More research about restorative treatments and filling materials used, their cost, duration, and possible effect on patient health is relevant for a discussion on CAP's long-term effects on oral health.

Further, a clearer focus on efficiency is important. In dentistry, efficiency assessment requires the measurement of the dental health care goal: oral health and quality of life. If oral health and quality of life of patients are not studied, reliable results regarding the true efficiency of financial systems will not be obtained.

As previously mentioned, a temptation to underprescribe dental treatments was found among the CAP dentists in the British CAP trial (Holloway *et al*., 1990; Mellor *et al*., 1990). Another finding, not reported in the review, was that CAP dentists felt a lower degree of allegiance toward their patients, than their FFS counterparts. The difference was small, but statistically significant (Mellor *et al*., 1990). Further research to see if the degree of allegiance felt by the dentist influences treatment would be of interest.

The different work style and philosophy in CAP might not only affect preventive and restorative care.

With the previously reported increase in preventive advice for oral self-care, it is not too far-fetched to expect that CAP also lead to a different style of dentist-patient communication.

Another aspect that requires additional research is how CAP affects the psychosocial aspect of the working environment in dentistry. This research should address such topics as dental team cooperation and stress.

Conclusions

The six questions put in the introduction can now be answered:

1. Does CAP increase or decrease caries incidence?
   There seems to be a long-term tendency of decreased caries incidence.
2. Does CAP increase or decrease restorative treatments?
   Yes, it decreases restorative treatments.
3. Does CAP increase the preventive care?
   Yes, CAP increases the preventive care, mainly preventive advice and fissure sealants.
4. Does CAP increase or decrease productivity?
   It is not possible to draw any conclusions regarding productivity, but it seems that it at least does not decrease.
5. Does CAP increase or decrease the dentist's satisfaction with his/her work?
   It is not possible to draw any conclusions regarding dentist satisfaction, but it does not seem to decrease.
6. Does CAP increase or decrease the patient's satisfaction with the oral care provided?
   It is not possible to draw any conclusions regarding patients' satisfaction with the oral care provided, but it seems that it at least does not decrease.

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