



## Payment systems and incentives in dentistry

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Abstract:	<p>In this commentary, we discuss the advantages and disadvantages of the following incentive-based remuneration systems in dentistry: fee-for-item fee-for-service remuneration, per capita remuneration, a mixed payment system (a combination of fee-for-item fee-for-service remuneration and per capita remuneration) and pay-for-performance. The two latter schemes are fairly new in dentistry.</p> <p>Fee-for-item Fee-for-service payments secure high quality, but lead to increased costs, probably due to supplier-induced demand. Per capita payments secure effectiveness, but may lead to under-treatment and patient selection. A mixed payment scheme produces results somewhere between over- and under-treatment. The prospective component (the per capita payment) promotes efficiency, while the retrospective component (the fee-for-service payment) secures high quality of the care that is provided. A pay-for-performance payment scheme is specifically designed towards improvements in dental health. This is done by linking provider reimbursements directly to performance indicators measuring dental health outcomes and quality of the services. Experience from general health services is that pay-for-performance payment has not been very successful. This is due to significant design and implementation obstacles, and lack of provider acceptance.</p> <p>A major criticism of all the incentive-based remuneration schemes is that they may undermine the dentists' intrinsic motivation for performing a task. This is a crowding-out effect, which is particularly strong when monetary incentives are introduced for care that is cognitively demanding and complex, for example as in dentistry. One way in which intrinsic motivation may not be undermined, is to introduce a fixed salary component into the remuneration scheme. Dentists would then be able to choose their type of contract according to their abilities and their preferences for non-monetary rewards as opposed to monetary rewards. If a fixed salary component cannot be introduced into the remuneration scheme, the fees should be "neutral"; i.e. they should just cover the costs of the services provided. This is one way in which supplier-induced demand can be limited, and costs contained.</p>

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## Abstract

In this commentary, we discuss the advantages and disadvantages of the following incentive-based remuneration systems in dentistry: ~~fee-for-item~~ **fee-for-service** remuneration, per capita remuneration, a mixed payment system (a combination of ~~fee-for-item~~ **fee-for-service** remuneration and per capita remuneration) and pay-for-performance. The two latter schemes are fairly new in dentistry.

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A major criticism of all the incentive-based remuneration schemes is that they may undermine the dentists' intrinsic motivation for performing a task. This is a crowding-out effect, which is particularly strong when monetary incentives are introduced for care that is cognitively demanding and complex, for example as in dentistry. One way in which intrinsic motivation may not be undermined, is to introduce a fixed salary component into the remuneration scheme. Dentists would then be able to choose their type of contract according to their abilities and their preferences for non-monetary rewards as opposed to monetary rewards. If a fixed salary component cannot be introduced into the remuneration scheme, the fees should be "neutral"; i.e. they should

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11 Key words: ~~fee-for-item~~ **Fee-for-service** remuneration, per capita remuneration, pay for-  
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16 Running head: Incentives and payment systems in dentistry  
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## Background – types of payment system

Economic theory and common sense both suggest that the way people are paid affects their working pattern. This is also the case for dentists. Historically, there have been three ways of paying for dental care: fee-for-service, salary and capitation<sup>1</sup>. Each of these payment systems creates very different incentives, and they each have their strengths and weaknesses. Often, attention has been directed towards the weaknesses. For this reason, during the last decade, there has been an increasing interest in modifying existing systems and developing new systems<sup>2</sup>. A new payment system that is emerging in dentistry is pay-for-performance<sup>3,4</sup>. There is also a trend towards combining different systems; for example, fee-for-service in combination with capitation.

In this commentary, we will give a brief overview of the most important payment systems as they relate to dentistry, and then describe the effects that the different models can have on dentists' behaviour. The advantages and disadvantages of the different models will be discussed. The issue is whether the different payment systems achieve their intended outcomes, such as access to high quality dental care and, probably just as importantly, whether they lead to unintended outcomes such as unnecessary treatment or the avoidance of care for patients with special needs<sup>5</sup>.

Health economics, which includes the topics of payment systems and incentives, has become a valuable discipline for studying market failures in health care. Analyses based on models from health economics are used more and more in dentistry, mainly as an aid to clinical and administrative decision making. Previous reviews deal with topics such as the structure and function of dental care markets, the role of dental insurance, economic determinants of oral health, including production of oral health, and economic evaluation<sup>6-10</sup>. The present review fills a gap in the literature, by presenting a comprehensive overview of how dentists are influenced by type of payment system.

## Fee-for-service and apple pickers

Fee-for-service is the dominant form of payment both in dentistry and medicine. To illustrate the scope of the use of this payment system: in Medicare in the USA there are 7000 procedures that have their own fees<sup>11</sup>. In public and private insurance programmes fees are usually set administratively. In dental care markets without insurance programmes, fees are determined by market forces. Since dentists are paid a fee for every unit of care they deliver, their income is directly related to their level of activity.

Pure fee-for-service based payments, although highly prevalent, have come under widespread criticism. Decades ago, the well-known Professor of Economics Burton Weisbrod argued: "Payments based on the level of activity are suitable for paying apple pickers, but not physicians"<sup>12</sup>. For several reasons, it makes sense to use strong incentives for apple pickers: It is easy to measure whether they are delivering the desired product, and the cost of measurement is low. The product of apple picking is well defined and precise, so there is little concern that rewarding apple picking diverts attention away from other activities that an employer would want apple pickers to carry out<sup>12</sup>.

In contrast, much of the work that dentists do is complex and highly dependent on the specific needs of each particular patient. We want dentists to use their knowledge, experience and skills to exercise sound judgment in their clinical decision making, and to do this in the best possible interest of the patients<sup>13</sup>. Further, any attempts to reward some activities run the risk of diverting dentists' attention away from other areas that could be important, but more difficult to measure, such as prevention<sup>14</sup>.

Because fees reward dentists for each type of service they provide, a fee-for-service payment system may encourage more treatment than is necessary<sup>15-17</sup>. Such unnecessary treatment may take different forms<sup>18</sup>:

- a) Treatment which is not necessary at all; for example where a dentist fills a non-existent cavity, or fills a small cavity where most dentists would wait to see if caries developed<sup>19-21</sup>.
- b) Cases where some treatment is necessary, but what is proposed is in excess of treatment which is considered necessary<sup>22-24</sup>.
- c) Cases where the treatment is inappropriate; for example where the dentist prescribes treatment which requires the co-operation of the patient which the dentist has no reasonable expectation of receiving<sup>25-27</sup>.

The dividing line between what is too much treatment as opposed to appropriate treatment is often narrow, and may be difficult to determine in individual cases<sup>28</sup>. In addition, there may be lack of evidence and data in relation to what might be considered adequate levels of dental treatment. Therefore, in situations where the criteria for interventions are unclear and/or ambiguous, dentists have the possibility to provide more treatment than is necessary. This may occur because dentists are more concerned about their own economic interests rather than patients' welfare. This is known as supplier-induced demand, and it is considered to be one of the major weaknesses of a fee-for-service payment system. Supplier-induced demand is commonly studied using agency theory as the guiding theoretical framework<sup>29</sup>.

The basic idea of agency theory is that the dentist acts on behalf of the patient. Ideally, the dentist should act only in the patient's best interest. In certain situations this may be difficult, because sometimes the dentist is motivated to act in his/her own interests, rather than those of the patient<sup>29,30</sup>. An ideal payment system neutralizes the dentist's self-interest – this is eliminated from “the picture”. The patient's welfare is then maximized.



## Fee-for-service and dentist's self-interest

The background for the hypothesis on supplier-induced demand is the assumption of asymmetric information between the dentist and the patient. The patient does not have sufficient expertise to evaluate the extent and quality of the services supplied. Therefore, the dentist has two roles: to act as the patient's adviser and to offer dental care. In the role of adviser, he or she has a considerable influence on the type and quality of services offered. Since the patient is poorly informed, the dentist has the possibility to influence the amount of supervision and care provided. He or she can also influence the number of consultations by deciding on the recall interval. Competition for patients can influence the dentist's economic incentives. The question is whether competition influences the dentist's behaviour such that he or she induces demand for dental treatment. If this is the case, then this leads to increased costs for the patient and for society as a whole. There are few studies on supplier-induced demand in dentistry. The studies that exist support the supplier inducement hypothesis<sup>15,16,31-33</sup>. Typically, they find an increase in the cost per visit as the supply of dentists increases.

The mechanisms behind supplier inducement are shown in Fig. 1<sup>34</sup>. Let us assume a competitive market where fees are determined by market forces. The figure shows the relationship between dental fees and the amount of dental services demanded. Increased competition for patients, for example, if a new dentist moves into a certain geographical area, means that fees fall from  $F_0$  to  $F_1$ . Lower fees are then meant to lead to an increase in quantity from  $Q_0$  to  $Q_1$ . The increase in consumption occurs as a movement along the demand curve  $D_0$  (**Fig. 1, top diagram**). From a welfare economic aspect, this increase in the quantity demanded is considered to be acceptable. Patients consume more dental services because they have become cheaper, and competition has led to a reduction in fees.

The supply curves in Fig. 1 are vertical. They are perfectly price inelastic; **i.e. the quantity supplied is unresponsive to price changes**. They are drawn like this to simplify interpretation. The above conclusion does not change in the case of a price-

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4 elastic supply curve; **i.e. when the quantity supplied is responsive to higher or lower**  
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6 **prices.**  
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9 Fig. 1, **bottom diagram**, also shows what happens if competition does not work under a  
10 fee-for-service payment system. Supply, in the form of new dentists establishing a  
11 practice in a geographical area, also increases here from  $S_0$  to  $S_1$ . However, this increase  
12 in supply is not followed by a corresponding reduction in fees. Competition means that  
13 the dentist's income is threatened. The dentists counteract a fall in income by increasing  
14 the quantity of services provided and by increasing their fees. In Fig. 1, **bottom**  
15 **diagram**, this is illustrated by the dentists moving the demand curve outwards from  $D_0$   
16 to  $D_1$ . The amount consumed also increases from  $Q_0$  to  $Q_1$ , as in the above figure. But  
17 this increase in quantity has not occurred as a result of a reduction in fees. Rather, it is  
18 the result of failure of competition. New dentists have been able to establish a practice,  
19 without this leading to a corresponding pressure to reduce fees. This leads to increased  
20 costs for dental services, as illustrated by the shaded area in Fig. 2, bottom diagram.  
21 Costs are defined as fees multiplied by quantity; i.e. the amount of dental services  
22 provided. In Fig. 2, the shaded area in the bottom diagram (induced demand) is larger  
23 than the shaded area in the top diagram (no inducement).  
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36 The induced demand as illustrated in Fig. 1, **bottom diagram**, is so high that fees are  
37 raised above their initial levels. Clearly, a lesser form of inducement is possible whereby  
38 the inducement results in a new equilibrium fee below the old one but above what it  
39 would be without inducement<sup>35</sup>. In that case the demand curve does not move as far out  
40 as illustrated on Fig. 1, **bottom diagram**.  
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46 When the concept of supplier-induced demand was introduced in the 1970s and 1980s, it  
47 had negative connotations - provision of services that were ineffective, and thus wasteful  
48 or even harmful<sup>36-38</sup>. During the last few decades, this view has been modified. It has  
49 been argued that supplier-induced demand is less of a problem as long as the extra  
50 utilization (i.e. the extra costs) leads to improvements in health<sup>39-41</sup>. Yet there are no  
51 studies in which the relationship between increased utilization due to the contribution of  
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supplier inducement to the health status of patients has been examined. Such studies are not easy to carry out. This is partly because many of the clinical procedures and interventions used in health care, dental care included, have not been subjected to clinical evaluation<sup>42,43</sup>. For procedures and interventions where clinical effectiveness has been proven, supplier inducement may be beneficial. However, this would only be the case if the extra costs of the services provided due to inducement are less than the benefits to health<sup>39,40,44,45</sup>.

In order to contain costs, two alternative payment systems are commonly suggested: pay for performance and per capita payment<sup>46,47</sup>. A prerequisite for the use of both these payment systems is a reasonably strong third-party payer, in principle either public or private insurance schemes.

### **Pay-for-performance – cost containment by targeting provider reimbursements**

Fee-for-service payments are associated with a high level of utilization, without that necessarily leading to better health outcomes<sup>46,48</sup>. Pay-for-performance is meant to remedy this weakness. This is done by linking provider reimbursements directly to performance indicators measuring health outcomes and the quality of the services<sup>47</sup>. Providers are paid for “doing the right thing, at the right time, in the right way, delivered to the right patient”<sup>49</sup>. In the long run, it is accepted that this will lead to a reduction in the growth of health care costs. In the beginning, pay-for-performance was often implemented as a mandatory programme with financial penalties for not achieving the targets. This became very unpopular among providers, hence the focus today is on rewarding providers if targets are met<sup>4</sup>.

During the last two decades, interest in applying pay-for-performance to health care has greatly increased. Pay-for-performance has been adopted as a key strategy among public purchasers (Medicare) and private purchasers (MCOs) in the USA, and within national

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4 health services in several European countries<sup>50-52</sup>. For example, in Medicare in the USA,  
5 there are more than 100 performance indicators where physicians are rewarded if targets  
6 are met<sup>50</sup>. In 2003 the British National Health Service implemented probably the most  
7 ambitious pay-for-performance programme in the world<sup>53,54</sup>. More than 100 targets were  
8 set and sizeable payments to physicians who achieved the targets were made. Altogether  
9 about 80 % of family practitioners' activities were covered by performance indicators.  
10 The programme acceptance was high, and nearly all the practitioners reached the targets;  
11 i.e. the financial incentives worked.  
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20 Despite its widespread use, there is no clear evidence that health outcomes, or even the  
21 quality of services, has improved<sup>47, 55-60,61</sup>. There are several reasons; the most important  
22 is probably that it is difficult to identify the type of indicators that lead to improvements  
23 in health. Further, numerous studies have shown that several programmes suffer from  
24 significant design and implementation obstacles, and lack of provider acceptance.  
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28 Despite these problems, pay-for-performance continues to expand in medicine.  
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32 Although initially designed for medical care, pay-for-performance can also be  
33 considered for dentistry. However, it is not used very much. One exception is that pilot  
34 studies have been conducted in the National Health Service in England. In these studies,  
35 one element of dentists' remuneration was based on dentists' performance according to  
36 indicators of quality<sup>62,63</sup>.  
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41 History has shown that the dental profession often follows in the footsteps of medicine<sup>3</sup>.  
42 If evidence can be provided that pay-for-performance improves the quality of dental care  
43 and limits costs, then the case for its introduction would be strengthened. At the moment  
44 such evidence is lacking. Also, there are some obstacles that make implementation  
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48 difficult.

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50 One such obstacle is the lack of clinical markers that are valid indicators of the severity  
51 of dental diseases<sup>64</sup>. This is different from in medicine. For example, for the  
52 management of diabetes, the hemoglobin A<sub>1c</sub> level is an established indicator of disease  
53 control. Similarly, blood pressure is used for hypertension control. Clinical indicators  
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4 with a sufficiently high sensitivity and specificity do not exist for the management of  
5 dental caries and periodontitis<sup>65-67</sup>. Other quality indicators, such as psychosocial  
6 outcomes, also have low sensitivity and specificity. Thus, it is difficult to create  
7 performance indicators that are related in a meaningful way to the prevention and  
8 development of the two most prevalent diseases in dentistry: caries and periodontitis<sup>68-71</sup>.  
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14 Within dentistry there is an abundance of published research, but evidence about the  
15 effectiveness of many areas of treatment is lacking. For example, the Cochrane  
16 Collaborative Group has reviewed nearly 100 different types of diagnostic tools and  
17 treatment within dentistry<sup>64</sup>. They have found insufficient evidence for many of them.  
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19 This is partly the reason why there are few widely accepted guidelines in dentistry.  
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24 For a pay-for-performance programme to be successful, the following criteria should be  
25 fulfilled: the objectives have to be clear, the performance indicators need to be valid, the  
26 analysis and the interpretation of the performance data need to be unambiguous and  
27 provider acceptance needs to be high<sup>47,72</sup>. At the moment, a pay-for-performance  
28 programme with these characteristics cannot easily be designed in dentistry. Therefore,  
29 our guess is that it will still take some time until such programmes are implemented on a  
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### 40 **Per capita payment and cost containment**

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42 With a purely per capita contract, the dentist gets a set sum for each person he or she has  
43 responsibility for providing dental services to. This is also the strength of a per capita  
44 contract – dentists who wish to work a lot get rewarded for their efforts. In other words,  
45 a per capita contract leads to higher production per dentist<sup>1</sup>. This has implications for  
46 dental education policy. Under per capita remuneration fewer dentists would be needed,  
47 and therefore fewer dentists would need to be trained, leading to savings.  
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54 Since the money follows the patient, independent of the amount of care provided,  
55 capitation is meant to contain costs per patient, but might lead to underprovision of  
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4 services, i.e. dentists may under-treat patients in order to save costs. Further, patient  
5 selection is a potential problem. Since dentists get a fixed fee per patient under  
6 supervision, it pays to have responsibility for many healthy patients. This gives a high  
7 remuneration with little effort<sup>48</sup>.  
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12 One possible way in which under-treatment and patient selection can be limited is risk  
13 adjustment of the per capita fee. If patient groups with high treatment need can be  
14 identified according to a few observable characteristics, then these characteristics can be  
15 used in order to differentiate the per capita fee. However, note that the differentiation  
16 must not be made on the basis of characteristics that the dentist can manipulate  
17 himself/herself, for example, level of dental disease. A higher per capita rate for patients  
18 with a lot of caries can seem like a good idea. However, the problem is that the dentist  
19 can be tempted to over-register caries in order to get a higher per capita fee.  
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24 It is difficult to find good indicators at the patient level that can differentiate between  
25 individuals with high and low levels of disease. Most indicators, such as age and gender,  
26 have relatively low sensitivity and specificity<sup>73-75</sup>. This has led economists to suggest a  
27 two-part or a mixed payment system<sup>11,46</sup>.  
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### 38 **Mixed payment system – the best of fee-for-service and per capita** 39 **payment** 40 41

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43 The underlying idea behind a mixed fee-for-service and a capitation payment is to avoid  
44 the adverse effects and to take advantage of the favourable effects of each system.  
45 Therefore, a mixed payment system may produce results somewhere between over- and  
46 under-treatment. The prospective component, i.e. the per capita payment, will promote  
47 efficiency, while the retrospective component, i.e. the fee-for-service payment, will  
48 secure the quality of the care that is provided<sup>11</sup>.  
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55 How large should the per capita component be in comparison to the fee-for-service  
56 component? This will depend on the characteristics of the population being served. For  
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example, in most Western European countries, the majority of children and adolescents have good dental health, with few treatment needs. Within such a population, the per capita payment should be large<sup>76</sup>. That will lead to high productivity, which is what we want. Conversely, the fee-for-service payment should be large in a population of elderly people<sup>77</sup>. That will reduce the risk of patient selection and **under-treatment**.

### **Incentive-based payment systems weaken intrinsic motivation**

The three types of incentive-based payment system discussed so far have a strong intuitive appeal, as they link output directly to monetary rewards. This follows from the traditional view of economists that monetary rewards are the key motivating factor for performing a task: performance rises with payment. This view of economists is in conflict with the view of psychologists, who emphasise that intrinsic motivation may be just as important as ~~external~~ **extrinsic** motivation<sup>5,56,78,79</sup>. Intrinsic motivation refers to the desire to perform an activity for its own inherent rewards<sup>78</sup>. It refers to incentives that are unrelated to profit. Typically, intrinsic motivation is related to activities that the dentist considers inherently interesting and challenging.

A large amount of experimental evidence from psychology shows that when an activity is driven by intrinsic motivation, such as professionalism, or pride in the quality of one's work, then adding a financial motive might undermine, or "crowd out", intrinsic motivation<sup>5,78-80</sup>. This reduces the incentive effect from monetary rewards. In the worst case, crowding out may lead to less production rather than more. This would be the case if intrinsic motivation is high and the crowding out effect is strong.

There are several theories about how monetary rewards can undermine intrinsic motivation<sup>5</sup>. One mechanism is by questioning one's sense of autonomy and competence, which may result in poorer performance. Further, monetary rewards may be perceived as being controlling, with the implication that professionals take less responsibility for

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4 motivating themselves. The desire to perform well may also be weakened when it is no  
5 longer one's own idea to perform well.  
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9 The "crowding-out effect" is particularly strong when monetary incentives are  
10 introduced for care that is cognitively demanding and complex, because such work is  
11 often inherently challenging and interesting<sup>81,82</sup>. This could be the case for medicine and  
12 dentistry. For simple, repetitive tasks, financial incentives work just as economic theory  
13 predicts<sup>79,80</sup>. For these types of task, intrinsic motivation cannot be undermined, since it  
14 hardly exists at the outset.  
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20 Within the field of medicine, empirical research on "crowding-out" effects is just  
21 starting. Probably, so far, the most promising research has been done by Jonathan  
22 Kolstad, who recently won the Arrow Award in Health Economics for his work on the  
23 role of intrinsic motivation in providing high quality hospital care<sup>83</sup>. The study was  
24 performed in two steps. First, he estimated how heart surgeons in Pennsylvania  
25 responded to information about the quality of their CABG surgery, measured as the  
26 mortality rate of their patients. This information was *not* made available to the public or  
27 potential patients. The estimated response from this first analysis is a measure of  
28 intrinsic motivation. Second, he measured how surgeons responded when the  
29 information was *also* made available to the public or potential patients. This is a measure  
30 of both intrinsic and extrinsic motivation. Here, the issue is to what extent surgeons  
31 changed their clinical behaviour due to a loss of their market share for patients. All the  
32 analyses were performed on a set of data encompassing nearly 100,000 surgical  
33 procedures during the period 1994 to 2003. In his paper, Jonathan Kolstad (2013)  
34 concludes: "the intrinsic response to quality information leads to a significant decline in  
35 mortality rates and is large relative to the response from monetary rewards"<sup>83</sup>. In fact,  
36 his analyses showed that the intrinsic response was four times as large as the extrinsic  
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53 To our knowledge, within dentistry, there has been no research on "crowding-out"  
54 effects. However, the evidence from the field of psychology and from the work of  
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Jonathan Kolstad has relevance for dentistry<sup>79,80,83</sup>. This is particularly so for fee-for-service and pay-for-performance contracts. Both these types of contract, fee-for-service in particular, are based on a high level of contractual detail - a too high level some would argue. Not every aspect of dentists' work is measurable. Often, it is more or less impossible to make an airtight agreement between dentists and patients/insurance companies where all details with respect to dental treatment can be specified in advance. The more aspects of performance above the necessary minimum that are measured, the stronger the "crowding-out effect" is likely to be. Unnecessary measuring will easily undermine the dentists' sense of autonomy, and be perceived as being unnecessarily controlling. With respect to contractual detail, more may not be better. In fact, it may even be worse: if something is omitted from a detailed contract, dentists may not necessarily do the work. One may end up with a system where dentists would only do something because they are paid for it, not because they are professionally and ethically obliged to do it. In such a situation the quality of the work dentists do may suffer; for example by dentists not using their competence to fully benefit their patients<sup>3,4</sup>. This is a potential danger with detailed fee-for-service and pay-for-performance contracts<sup>13</sup>.

### **Rewards under the control of the dentist - the advantages of flexible contracts**

Is there any way in which payment systems can be designed so that intrinsic motivation is not undermined? One approach is as much as possible to make the amount of rewards, and hence income, under the direct control of the dentists. This can be done by offering a set of flexible types of contract, and then letting the dentists' choose their type of contract according to their preferences and abilities<sup>84</sup>. The idea is to allow dentists to keep their sense of autonomy and to avoid making them feel too much controlled. As an example, let us illustrate how this works in the case of a fixed salary versus a per capita contract. The train of thought and the conclusion presented at the end also holds in the case of a fixed salary versus a fee-for-service payment system. The theoretical

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4 framework for this analysis has been developed by the award-winning American  
5 economist Edward P. Lazear, who has written numerous papers and books on the topic<sup>85-</sup>  
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11 **The trade-offs that two hypothetical dentists are prepared to accept between how**  
12 **hard they work and how much they are paid are represented in Fig. 3. The**

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14 indifference curves represent dentists with different preferences. The curves slope  
15 upwards because output requires effort, while income is a good. Thus dentists who put  
16 in more effort must be compensated with more income in order to be indifferent.  
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18 Consider two types of dentist. One type is ambitious and prefers to work more, earn  
19 more, and have less leisure time. The other type is not so ambitious, prefers to work less,  
20 earn less and have more leisure time. The dentist with high ambition has an indifference  
21 curve that is not as steep (dotted lines). He or she is less averse to work, and additional  
22 effort can be compensated for by a smaller increase in income. The dentist with low  
23 ambition has a steep indifference curve, because additional effort must be compensated  
24 for by a large increase in income, as indicated by the solid indifference line through A.  
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33 A payment system based on fixed salary is shown by a function that starts at zero,  
34 becomes vertical at  $e_0$  and then horizontal at point A.  $e_0$  represents the minimum level of  
35 output that must be produced in order keep one's job. If the dentists are offered a fixed  
36 salary only, they are most likely to choose to work at point A, since there is no financial  
37 reward for putting in more effort. Then they will be paid a set hourly wage.  
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43 The per capita payment scheme is the same as the fixed salary scheme up to  $e^*$ , but then  
44 compensation rises with output, as shown by the solid, positively-sloped line. When  
45 dentists can choose between an incentive-based payment system and a fixed salary  
46 scheme, the less ambitious dentist still chooses point A, while the more ambitious dentist  
47 chooses point B. Then the satisfaction of the more ambitious dentist has increased, while  
48 the satisfaction of the less ambitious dentist is unaltered. Dentists have been able to  
49 choose their type of contract according to their abilities and their preferences for non-  
50 monetary rewards as opposed to monetary rewards. The fact that dentists are not an  
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homogenous group has been taken into account. They are not forced to work under the same remuneration system. This makes it less likely that their intrinsic motivation is undermined.

What about the effectiveness under a payment system with flexible contracts? It depends on the point of departure. If all dentists were originally paid a fixed salary, then the total supply of services would increase when dentists are offered an incentive-based type of contract. The mean increase per dentist for those who change their type of contract is equal to the distance  $e_0 - e_1$  in Fig. 3. On the other hand, if the point of departure is that all dentists originally were offered a fee-for-service contract, then total supply would decrease when dentists were offered a fixed salary contract. The benefits would be that satisfaction and probably internal motivation would have increased for dentists who were given the opportunity to be paid a fixed salary.

### **The lack of third-party payers makes fee-for-service payments unavoidable**

With the exception of fee-for-service, the other payment systems require a strong third-party payer, for example a public or private insurance scheme. Dentistry is different from medicine in that third-party payers are not that common. This is the reason why, in most countries, fee-for-service is the dominant payment system within dentistry. This is particularly so in countries that have primarily based their welfare services on private solutions and supply. With fee-for-service financing, the dentist is remunerated according to the actual cost of the treatment. In that way it is easier to ensure quality with this system than with a per capita system. However, the challenge with a fee-for-service system is cost control, mainly due to supplier inducement (Fig. 2, **bottom diagram**)<sup>15,16</sup>. How can this adverse side effect be reduced to a minimum?

First, it is important to establish a culture among dentists that focuses on the ethical aspects of service provision<sup>34</sup>. Norms should be established within the organization that

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counteract any tendency for dentists to be tempted to achieve financial gains at the expense of the patient. The authorities have a role in terms of supervision and continual monitoring of the quality of the services provided, and hopefully this will also have an effect on the behaviour of the individual dentist.

Second, if possible, the authorities should try to implement a “neutral” fee-for-service payment system<sup>11</sup>. In such a system the fee covers just the costs of the service provided. An economically neutral payment system has the potential to take dentists’ self-interest out of the picture by paying the exact cost for each item of treatment. In such a system marginal revenue is equal to marginal cost. This approach, with “neutral” fees, is only possible within a system with administered set fees, set either by a public or private insurance scheme. Even with neutral fees, fee-for-service payments are made on the basis of the volume of services delivered<sup>11</sup>.

Pay-for-performance is an alternative to a fee-for-service payment system. Pay-for-performance is based on value-based pricing, where value is defined as health outcomes achieved per monetary unit spent<sup>88-90</sup>. With pay-for-performance, focus is shifted from volume to value. Within dentistry, measuring value is a challenge, partly because evidence about the effectiveness of many types of dental treatment is lacking.

## Conclusion

The available evidence shows that providers respond to incentives, both monetary and non-monetary rewards. The strength of the response and the extent of unintended consequences both depend on the context in which incentives are introduced and the design of the incentive programme. In practice, dentists, administrators and policymakers seldom plan a dental service “from scratch”, but must relate to the financing systems that already exist within the established services. To a large extent the existing systems are determined by the institutional, historical and political contexts in which the dental services in the different countries have developed. However, whatever

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4 system, the adverse side-effects of each type of financing system should be reduced to a  
5 minimum. The possibility to succeed in that respect is to offer dentists a flexible type of  
6 contract in which a fixed salary component forms part of the contract. Unfortunately,  
7 such contracts are only feasible within an organization with a strong third-party payer.  
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7 Fig. 1. A competitive market model (top) and a model with supplier-induced demand  
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11 Fig. 2. Costs in a competitive market model (top) and in a model with supplier-induced  
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16 Fig. 3. The relationship between compensation and output  
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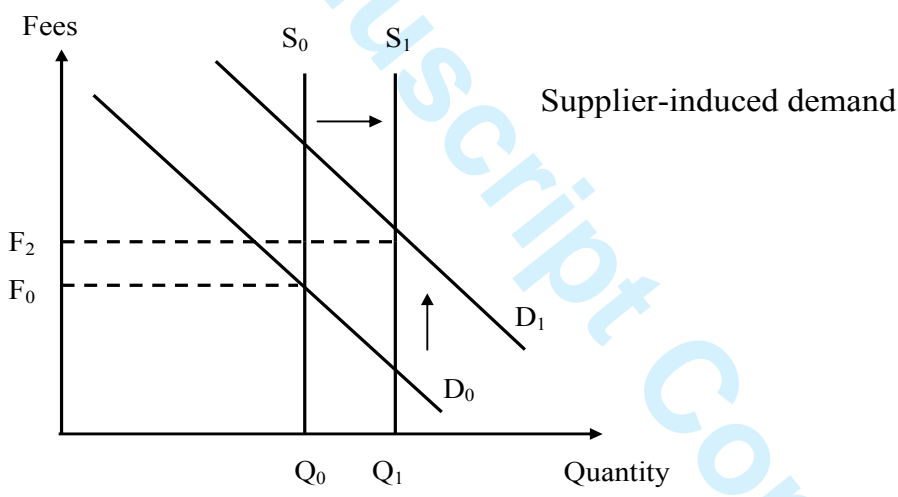
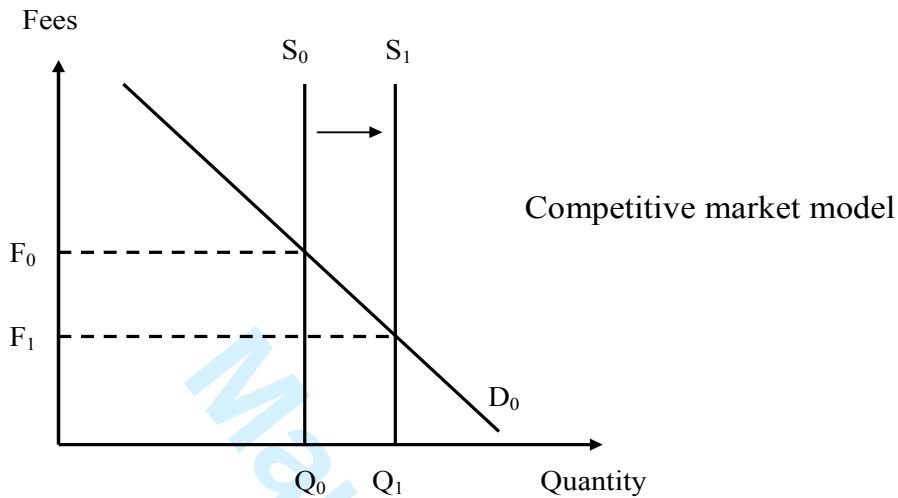


Fig. 1. A competitive market model (top) and a model with supplier-induced demand (bottom)



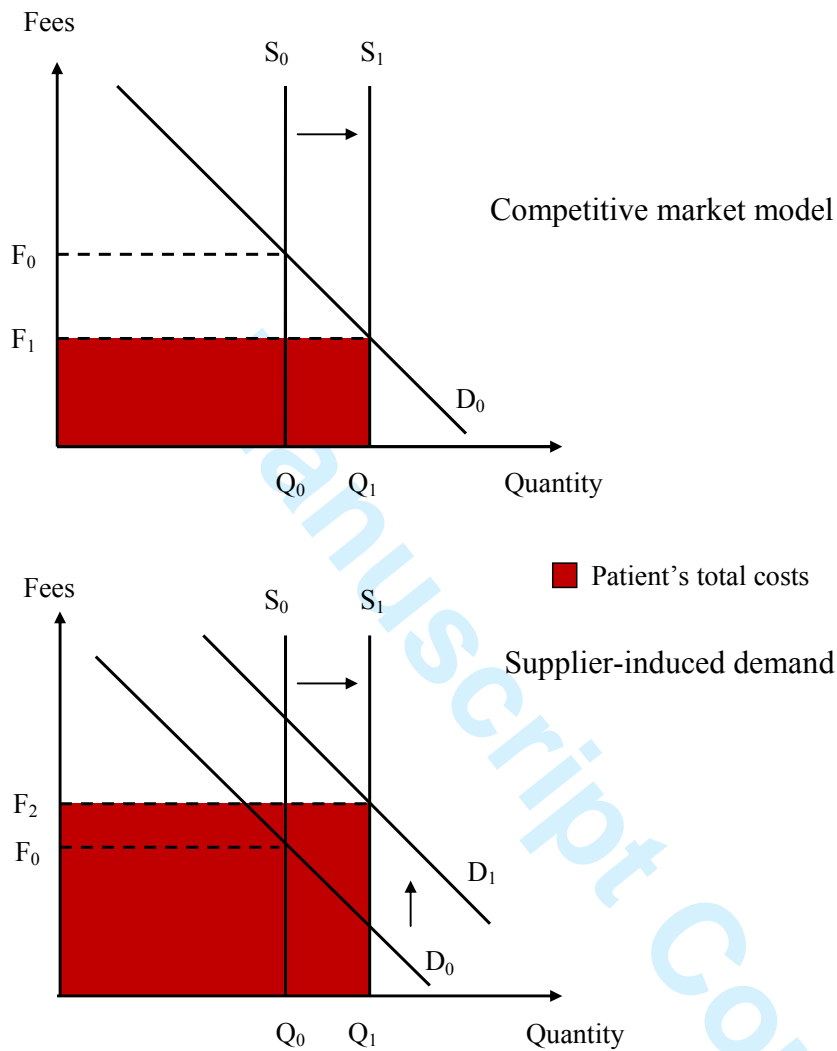


Fig. 2. Costs in a competitive market model (top) and in a model with supplier-induced demand (bottom)

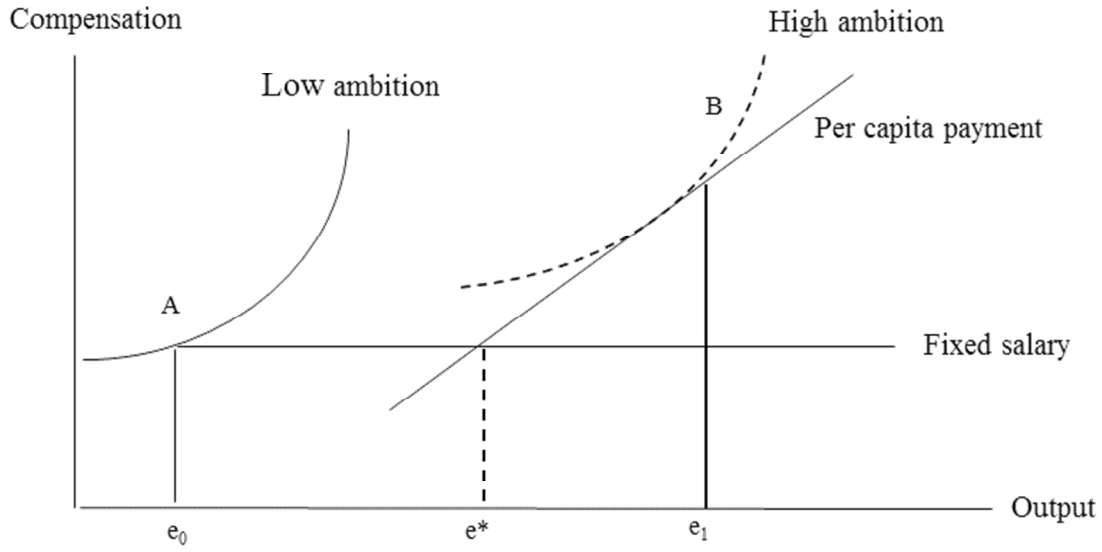


Fig.3. The relationship between compensation and output