Dutch hospitals, value for money? An exploratory study on the relationship between price and quality in the Dutch hospital sector.

1. Abstract

In this paper, the results of an exploratory study on the relationship between price and quality in the Dutch hospital sector are presented. After a major healthcare reform in the Netherlands, the hospital sector is moving from a state led, budget financed system to a system of managed competition. In this new system, hospitals are supposed to compete on both price and quality. Health care insurers are supposed to act as prudent buyers of healthcare. As prudent buyers insurers are supposed to act on behalf of their insured and on behalf of society as whole. This implies that insurers are to negotiate with hospitals not only on price, in order to contain healthcare expenditure, but also on quality to ensure maximum quality for their insured. The aim of this study is to examine to what extent a relationship between price and quality currently exists when hospitals are compared. In order to analyse this relationship, data on price and quality for selected Diagnosis Treatment Combinations (DTCs) have been collected and analysed. This study has been limited to the diagnoses diabetes and arthrosis, diagnoses with a high incidence and with a relatively long history of development of quality indicators. When Dutch hospitals are compared on DTC price and quality as measured by national performance indicators, no evidence indicating a relationship between price and quality can be found, at least for the diagnoses diabetes and arthrosis.

2. Introduction

In the past decade, the Dutch healthcare systems underwent major changes. Especially hospital care has changed dramatically in the way it is organised and financed. The

reimbursement system has changed from lump sum payment to output based payment on the basis of the hospital's production, measured in diagnosis treatment combinations (DTCs). The majority of DTC prices are determined on a national level by the Dutch Healthcare Authority, but for an increasing proportion of DTCs hospitals and insurance companies can freely negotiate on price.

Parallel to this transition the hospital sector has developed quality management systems, in which quality is measured and publicly released. All hospitals currently report on their quality of care. Insurance companies are supposed to not only negotiate on price, but to act as prudent buyers of care on behalf of their insured, negotiating on price and quality. To facilitate this process, the Netherlands Health Insurance Association annually publishes a "buyers guide" in which performance indicators for specific DTCs are defined.

A considerable amount of research has been done on this new role of insurance companies. Researchers conclude that insurers increasingly fulfil their new health maintenance organisation-like role. Research suggests that a form of free market, referred to as 'managed competition' successfully emerges. Transparency on quality of care is increasing at a rapid pace and price developments suggest a relationship between price and level of competition. The larger the number of hospitals in a region, the slower the increase of price. If the system was to fully function as intended, hospitals would have a financial incentive to increase their level of quality of care. Surprisingly, the relationship between price and quality in the Dutch hospital sector has so far not been evaluated. This research paper addresses that relationship. After a review of the relevant literature, a quantitative analysis is presented, in which the relationship between DTC price and quality is examined.

3. Literature review

In this section the relevant academic literature is reviewed. The section starts with a review of the literature on quality of care in general. The concept and origin of quality of care are explored. Subsequently, the concepts of public reporting on quality and paying for performance are examined. Finally, the Dutch situation is explored: the historical context is described, followed by an exploration of the recent developments.

3.1 Quality of care, concept and origin

Quality of care has been on the agenda of policy makers in the United States since the 1960s. By then, improving quality of care was mainly defined in terms of increasing access to healthcare for specific populations. In the 1970s, peer review was introduced as an instrument to improve the quality of healthcare, in the 1980s focus shifted towards implementing quality assurance systems. Since the 1990s marketplace competition and public report cards have been frequently identified as the best method to improve quality of care (Chassin, 1996). The rationale for public reporting of quality is found in the belief that public release of performance data will lead to behavioural change and improved quality. Patients' choices, purchasers' contracting decisions and physicians' referrals are supposed to be guided by quality data, thus motivating professionals and institutions to improve their quality level by means of implementing guidelines, appropriateness standards and industrial methods of quality management (Blumenthal and Epstein, 1996). The last decade can be characterised by a significant increase of performance based payment to improve quality in health care. This trend, that originated in the United States in the 1990s, has increasingly gained support in the US and is being introduced in Europe, since the beginning of the 21st century. Gradually, academic support for pay for performance is growing, studies have found effects, albeit

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modest, of pay for performance on process measures of quality and health outcome measures.
(Rosenthal, 2009). The concept of pay for performance is revisited in section 3.2.

Since the last decade of the twentieth century, more or less in conjunction with the
introduction of public reporting on quality, the academic and professional debate on quality
and the best way of improving it increased significantly. In the academic literature, several
reasons for the onset of the quality of care debate are identified. The first reason is the worry,
amongst professionals and non-professionals in the United States, that quality is jeopardised
by efforts to reduce cost of healthcare services. A second reason lies in the increased
biomedical knowledge and the increased knowledge of methods to measure and improve the
quality of care. Significant scientific developments have taken place in the field of clinical
epidemiology, outcome research, information technology and the coming to maturity of
quality management science in other sectors than healthcare. A third reason is found in the
changing criteria for optimal care and the growing complexity of medical care. (Blumenthal,
1996a).

One of the first definitions of quality of care to emerge in the literature was provided in 1980
by Donabedian, who defines high quality care as:

> *"[…] that kind of care which is expected to maximize an inclusive measure of patient welfare, after one*
> *has taken account of the balance of expected gains and losses that attend the process of care in all its*
> *parts."* (Blumenthal, 1996b: 892)*.

In 1984, the American Medical Association defined high quality care as care "which consistently contributes to the improvement or maintenance of quality and/or duration of life". In 1990, the American Institute of Medicine stated that quality consists of

> *"[…] the degree to which health services for individuals and populations increase the likelihood of desired health outcomes and are consistent with current professional knowledge"* (Blumenthal, 1996b: 892).

If one wants to establish the quality of care, one needs to be able to objectively measure evaluation criteria. Brook and Cleary (1996) conclude that quality of care can be evaluated on the basis of structure (e.g. physicians specialty, ownership of hospital, teaching status), process (e.g. tests performed on a patient) or outcome (e.g. improvement of symptoms or mobility). They identify five methods of quality assessment: three implicit methods (i.e. without prior standards or agreements about what reflects good or poor quality) and two explicit methods. In the implicit methods a health care professional answers one of the following questions: 'Was the process of care adequate?' (method one), 'Could better care have improved the outcome?' (method two) and 'Considering both process and outcome, was the overall quality of care acceptable?' (method three). In the fourth method, explicit process criteria are measured, e.g. has a diabetes patient undergone an annual funduscopic examination by an ophthalmologist? The fifth method uses explicit criteria to measure whether the observed results (individual patient or population level) are consistent with the outcome, based on a validated prediction model. Different indicators and different measurement methods each have their own value and pro and contra arguments. The discussion on what parameters to measure in order to establish good quality is an ongoing professional and academic debate (Jacobs, 2009).

3.2 Public reporting on quality and paying for performance

Based on the literature, one can conclude that public reporting on quality leads to an increase in quality. Several studies report beneficial effects of public disclosure of performance parameters (Hannan *et al.,* 1994; *Chassin et al.*, 1996). A recent showcase for success of public reporting is the effect of reporting on the parameter 'percentage of patients with acute myocardial infarction who receive a prescription for beta-blockers within seven days of hospital discharge' in the United States. After ten years of reporting on this parameter, initially showing dramatic differences between hospitals, the measure is no longer reported as of 2007, since all hospitals were on target by then (Lee, 2007).

One step further than having hospitals report on their performance on quality, is to link financial incentives to performance on quality. In the beginning of the 21st century several literature reviews have been published on the topic of financial incentives to increase quality. The largest review, reviewing over a hundred scientific publications, concludes that financial incentives can be used to improve compliance with practice guidelines or to achieve general health targets (Chaix-Couturier *et al.,* 2000). Other reviews (e.g. Robinson, 2001) report mixed and more nuanced findings with respect to the effect of physician payment incentives. Although there is an increasing amount of evidence in support of paying for performance on quality (e.g. Lindenauer *et al.,* 2007), there is still resistance amongst medical professionals, who emphasise adverse effects (e.g. Vonnegut, 2007).

Paying for performance seems to be an irreversible trend in the Unites States. In 2007, more than half the Health Maintenance Organisations (HMOs) in the private sector have initiated pay for performance programmes, covering over 80% of the country's HMO enrolees. The Medicare programme has also initiated pay for performance programmes (Epstein, 2007).

Although some form of paying for performance is common practice nowadays in the United States, the biggest pay for performance programme can be found in the United Kingdom: the National Health Service (NHS) has

> *"[…] adopted a payment-for-performance initiative of unprecedented size and scope. Nearly a third of a general practitioner's income will depend on the practitioner's performance as defined by 130 quality indicators."* (Epstein *et al.,* 2004: 406).

This system has not been forced upon the British GPs by the NHS. In 2003, 70% of family doctors took part in a ballot. 79% of these voted in favour of implementation of the system by April 2004 (Marshal and Smith, 2003). Back in 1986, the British Medical Association voted against implementation of the so-called 'Good Practice Allowance', the first British attempt to provide financial incentives for high quality care. Roland (2004) concludes that in the mid-1980s doctors still rejected the notion that quality could be measured. Since then a lot has changed: introduction of the concept of Evidence Based Practise (EBP) in healthcare, scientific evidence for high variation of quality of care in both the United States and Europe, and the coming of age of the quality measurement and improvement systems. These developments have lead to the acceptance of the British pay for performance system. Under the UK system, GPs' performance is measured on the basis of a wide variety of indicators: clinical process indicators (e.g. total cholesterol has been recorded during the previous 15 months), clinical outcome indicators (e.g. most recent blood pressure measure was 150/90 mmHg or lower), managerial / structure indicators (e.g. routine booking interval is 10 minutes or more) and patient satisfaction (Roland, 2004). An evaluative study in 2007 reports achievements exceeding the government's expectations. The authors conclude that

"[…] financial incentives are most likely to be an effective means of influencing professional behavior when performance targets and rewards are aligned to the values of the staff being rewarded." (Campbell *et al.,* 2007:189).

In a more recent study, the results are somewhat more nuanced:

"[…] the scheme accelerated improvements in quality […]. However, once targets were reached, the improvement […] slowed, and the quality of care declined for two conditions that had not been linked to incentives." (Campbell *et al,* 2009: 368).

In 2008, the British government presented plans to further intensify the pay for performance programme, including the introduction of flexible hospital funding, related to the quality of care for NHS patients, the introduction of best practice tariffs and a pilot with personal health budgets for patients, thus increasing the patients' freedom of choice of healthcare provider (NHS, 2008).

Although several successful initiatives have been described in the literature, several authors remain critical toward current market developments, especially in the United States. Porter and Teisberg speak of inaccessibility, uneven quality, alarming quality problems and uncontrollable increase of costs (Porter and Teisberg, 2006: xiii). Current financing systems discourage innovation and make healthcare providers compete on price rather than on quality (Porter and Teisberg, 2006: 145). Porter and Teisberg make a plea for a transition to a competition system in which the results play a much bigger role than they currently do in the Unites States. They describe this competition model as "value-based competition" (Porter and Teisberg, 2006: 147).

3.3 The Netherlands: managed competition

3.3.1 Historical context

In the past decades the Dutch healthcare system can be characterised as a pendulum swinging between corporatism and etatism. In the1960s and early 1970s, decades of economic growth and prosperity in the Netherlands, corporatist healthcare programs first emerged after decades of state-led healthcare. Individual healthcare providers, such as hospitals, successfully aimed for growth during this era, resulting in a dramatic increase of government expenditure on healthcare. In the late 1970s, however, the government's attitude changed from a laissez-faire attitude, leaving freedom for corporatism, back to an etatist policy style in order to contain cost (Helderman *et al.*, 2005). Using stringent budget caps, the Dutch government successfully reduced the health care expenditure to under 8.5 percent of the gross domestic product. During the 1980s, however, the top-down control by the government was increasingly criticised. Etatist policy measures on the formerly corporatist healthcare system had undermined internal consistency of the healthcare system and brought the government and private interests, healthcare providers and insurers into a permanent state of conflict. These developments led to the installation of a committee, the Dekker Committee, who was to advice the centre-right government on the future of the Dutch healthcare. The Dekker Committee came up with a masterplan to improve both efficiency and the equity of the healthcare system. The proponents of a new market oriented programme in the period 1988-1994 challenged many of the prevailing corporatist and etatist programmes. The necessary instrumental and institutional conditions for introduction of a market-oriented system, however, were completely absent. The new market oriented programme was too complex and failed to provide short term solutions. This failed introduction of market in the healthcare sector resulted in a new period of etatism from 1994 to the year 2000. During this time, in which the Dutch government strictly controlled supply and price, the government had not

stopped creating conditions for a new attempt to introduce elements of a free market-system in the Netherlands. This mixed approach can be explained by the composition of the 'purple' government in that time: a cooperation between a socialist (red) left-wing party, with a strong emphasis on the role of the government in healthcare, and a liberal-conservative (blue) right wing party aiming for a market-driven healthcare system. In 2001, a new market oriented healthcare reform plan was launched in which all citizens were to be privately insured and the healthcare insurance companies and healthcare providers were transformed into commercial risk bearing organisations. This transformation process required several years to become fully implemented, but the turn of the century had come with the introduction of managed competition in Dutch healthcare. Since the circumstances were different from the initial attempt to introduce market in the Dutch healthcare systems, both institutional and technical, the odds for he new post-2001 reforms were much more favourable (Helderman *et al.*, 2005). One of the major reforms in the new system was the introduction of pay for performance. The Dutch government did not choose to adapt to the internationally widely used diagnosis related group (DRG) system, but chose to develop its own case mix system knows as diagnosis and treatment combinations (DTC). A DTC defines the whole of the hospital's and medical specialists' activities and services arising from the demand of care by a patient. One of the reasons to defer from the 'international standard', was the desire to create transparency in the reimbursements for hospitals and the reimbursement of self-employed medical specialists, the vast majority of Dutch medical specialists. This reimbursement system, based on hospital products, should enable providers and healthcare insurers to negotiate about price, volume and quality of specific elements of hospital care (Custers *et al.,* 2007).

3.3.2 The development of hospital quality management in the Netherlands

The concept of 'quality of care' reached the Dutch hospital sector in the early 1990s. After some initial years of hesitant and slow development of initiatives on quality, the Dutch government came with a legal obligation to address quality of care in 1996 with the introduction of the Care Institutions Quality Act (Dückers *et al.,* 2009). At that time, there were no incentives to improve quality other than a legal obligation to report on quality initiatives and a mandatory adherence to some professional standards. With the introduction of the 2001 healthcare reform, hospitals were no longer fully funded on the basis of lump sum payment. A transition to payment based on output pricing began. This transition coincided with the development of a national set of quality indicators for hospitals in 2003. The combination of output based pricing and the development of a uniform set of quality indicators freed the way for the introduction of a new reimbursement system in 2005. Since then, the room to negotiate prices between healthcare insurers and hospitals gradually increased. Insurers were expected to not only negotiate on price, but also to reach agreement with hospitals on the level of quality of care for the insured. Hospitals responded both reactively and proactively on these changes. The reactive and defensive response was to merge with other hospitals to increase negotiation power, the proactive response was an investment in the hospital's quality management system. A recent study showed significant increase in the professionalism with which hospitals address quality. The authors conclude that

> *"[…] the combination of policy measures at macro level was accompanied by an increase in hospital size and the further development of quality management systems. Hospitals are entering the stage of systematic quality improvement."* (Dückers *et al.,* 2009: 330).

3.3.3 Recent developments and the current hospital care in the Netherlands: managed competition on price and quality

In the past years, several studies on the developments in the Dutch transition towards a more market-oriented health care system have been published. Schut *et al.* state that

> *"The feasibility of the reforms crucially hinges on the realisation of adequate methods of [...] product classification and quality measurement, an appropriate consumer information system and an effective competition policy."* (Schut *et al.,* 2005: S59).

In their 2005 study, Schut *et al.* conclude that

> *"Although considerable progress has been made in setting the appropriate stage for regulated competition in Dutch health care. The role of the market is still limited."* (Schut *et al.,* 2005: S59).

These findings are in line with the result of a study performed by Custers *et al.* (2006) who conclude that the system offers insufficient incentives for health care insurers and providers to steer on quality. "Additional incentives as part of the system reforms, are needed to create a business case for quality." (Custers *et al.,* 2007: 226). Although the effects were still limited in 2007, the new role of the insurance companies to negotiate not only on price, but also on quality, is widely recognised in the literature (Enthoven *et al.,* 2007; Hendriks *et al.,* 2009; Knottnerus *et al.,* 2007; Westert *et al.,* 2009). All authors do acknowledge a transition in the role of the insurance companies, but they differ in opinion to what extent the new system has led to an increase in quality of care and the maturity of the system. They all identify the current trends as positive developments, but the authors also agree on the fact that it is still 'work in progress'. The more recent the academic publication is, the more favourable the

author seems to be towards the developments. Apparently changes have occurred at a high rate in the past three years. Enthoven *et al.* (2007: 2422) define the new role of insurance companies as "prudent buyers of care" and "customer-driver organizers of care for the people they insure, similar to American health maintenance organizations". In 2007, hospitals and insurance companies were allowed to freely negotiate on price and quality of 10% of the total of 35,000 DTCs in Dutch hospital care. The government intends to gradually increase this proportion to 70%. In 2008 the percentage of freely negotiable DTCs increased to 20% and currently stands at 34% (Van der Ven *et al.,* 2009). Van der Ven *et al.* (2009) state that insurers are increasingly behaving as critical purchasers of care. Information on hospital quality performance is rapidly becoming more and more available. Hospitals are currently required to report on their quality, and this information is published by The Netherlands Health Care Inspectorate (IGZ) and released to the general public via the website www.kiesbeter.nl (make a better choice). To facilitate insurance companies in their negotiations, the Netherlands Health Insurance Association annually publishes a 'buyers guide' in which performance indicators for specific DTCs in the free segment are defined (Zorgverzekeraars Nederland, 2007). In order to facilitate the transition towards a free market the Dutch government founded the Dutch Healthcare Authority (NZa) in 2006. The NZa is the supervisory body for all the healthcare markets in the Netherlands. The NZa supervises both healthcare providers and insurers. The NZa defines its task as follows:

> *"The healthcare system is based on regulated market forces: it will only work if the players act efficiently and are given the correct incentives to do so. The NZa is the healthcare market supervisor, which gets the new markets going that emerge in the healthcare sector whenever it can. The aim of doing so is to provide consumers with accessible, affordable and proper health care."* (NZA, 2009).

In its annual Hospital Care Monitor 2007 the NZa concluded that hospitals and healthcare insurers negotiated with an increasing level of professionalism and an increasing eye for quality. Although quality of care was still judged as being insufficiently transparent, initiatives to improve transparency were developing steadily (NZa, 2007). In the year 2008 the NZa concluded that the free market was developing successfully: prices in the free segment had increased at a lower rate than in the regulated segment and the insurers had increasingly put pressure on hospitals to charge lower prices and to increase the level of quality (NZa, 2008a). Later that year, the NZa was able to even report a price decrease for a number of DTCs in the free segment (NZa, 2008b). The NZa reported some first signals of an emerging free market. In regions with a higher hospital density, such as the midwestern 'Randstad' region, prices were significantly lower than in rural regions with less competition. To what extent healthcare providers compete on 'value' rather than on price, as desired by Porter and Teisberg (2006) is not known. The extent to which quality is currently part of the healthcare purchasing negotiations in the Netherlands has not been researched. Neither is it currently known to what extent quality has become reflected in DTC price levels. The relationship between price and quality in the subject op this paper.

4. Methodology

4.1 Research question and approach

The aim of this study is to examine whether or not a relationship can be found between price and quality in the Dutch hospital sector. As described in section 3.3.2, part of the hospital prices are still fixed and part of the hospital prices can be negotiated between hospitals and insurance companies. Since insurance companies are supposed to incorporate quality in their negotiations, it would be fair to assume that when hospital prices are compared, a relationship can be found between price and quality.

The current (2009) prices are used in this research. These prices have been negotiated before the start of the calendar year, so in 2008. Since quality information is collected and released on an annual basis, 2008 information was not yet available at the time of the negotiations. 2008 information actually is still to be released. If a relationship between price and quality can be found, this should be between 2009 prices and 2007 quality performance. This is why 2007 quality information is used in this study.

This research is exploratory of nature and not explanatory. It only explores to what extent a relationship between price and quality can be found when comparing different hospitals. It does not aim to explain why such a relationship can or cannot be found. This would require addition of qualitative elements, such as interviews with negotiators or observations of a negotiation. This research is limited to an observational, quantitative analysis.

This study is cross sectional: it only includes information on current prices related to the relevant quality information. Longitudinal elements, such as questions like 'Do prices increase for an individual hospital if quality increases?' are not part of this research.

Since this research aims to investigate a relationship between price and quality, quality needs to be defined. As described in section 3.3.2, quality indicators have been developed in the Netherlands in order to objectively measure the level of quality provided by hospitals. This study makes use of these existing and publicly available quality indicators. The motives for selecting specific DTCs and quality indicators are further explained in section 4.2.

4.2 Selection of DTCs and indicators, specific research hypotheses

In order to define an appropriate sample, DTCs and performance indicators need to be selected. In order to maximise the chances of finding a relationship between price and quality, several criteria are formulated on the basis of which DTCs and performance indicators are selected. 1) The DTCs must be part of the non-regulated, freely negotiable segment. 2) To maximise the chances of uniform reporting, the quality indicators must have had a relatively long development. This implies that quality indicators are selected that have been part of the first implementation experiments, the so called 'Etalage indicatoren' (showcase indicators) (CBO/Orde, 2007). 3) To maximise the number of reporting hospitals and to increase chances of uniform reporting, the performance indicators must be part of the mandatory Netherlands Health Care Inspectorate reporting system (IGZ, 2009). 4) To maximise chances to find a direct relationship between price and quality, the performance indicators must specifically be identified as indicators that can be included in price and quality negotiation and are mentioned as such in the insurance buyers guide (Zorgverzekeraars Nederland, 2007). 5) To make sure that all hospitals are experienced in registering the correct DTC and measuring quality, the incidence of the DTC must be high, i.e. more than 15,000 per year nationwide (Zorgverzekeraars Nederland, 2007). 6) The quality indicators must be evidence based or at least based on an internationally accepted professional consensus (CBO/Orde, 2007). 7) The DTC must be a generic DTC: i.e. the diagnosis does not require highly specialised skills or equipment and the treatment must be offered by virtually every hospital. 8) Prices must be listed on the website www.kiesbeter.nl.

The total number of DTCs offered by Dutch hospitals is 35,000. Only five DTCs meet all the above mentioned criteria. Of these the two most frequently occurring DTCs are selected.

From the performance indicators related to these two DTCs, the ones for which a clear "desirable outcome" is specified in the buyers guide are selected .

This selection leads to the following two DTCs: "arthrosis in pelvic / hip / upper leg region with treatment in the form of clinical surgery including placement of a new joint prosthesis" (DTC code 05 11 1701 223, expected incidence 17,401 per year) and "diabetes mellitus without secondary complications, ambulatory treatment without special ambulatory care requirements and without clinical episodes" (DTC code 13 21 221 1101, expected incidence 37,050 per year) (Zorgverzekeraars Nederland, 2007: 65,197).

The related quality indicators are listed in table 1. For each indicator one specific hypothesis is formulated.

Selected Quality Indicators and Hypotheses

DTC	Indicator	Hypothesis

Diabetes

I1: Can and does the hospital report the percentage of patients who's retinas have been checked by or under supervision of an ophthalmologist?

> *H1: The average DTC price of hospitals that report the percentage of patients who's retinas have been checked is higher than the average DTC price of hospitals that do not report this percentage.*

I2: Percentage of patients that underwent a retina check by or under supervision of an ophthalmologist in the past 12 months

> *H2: The percentage of patients who's retinas have been checked is positively correlated to the DTC price.*

I3: Can and does the hospital report the number of HbA1c tests and their outcome?

> *H3: The average DTC price of hospitals that report the number of HbA1c tests and their outcome is higher than the average DTC price of hospitals that do not report the number of tests and the results.*

I4: Average number of HbA1c tests given to patients in the last 12 months

> *H4: The average number of HbA1c tests that a hospitals performs is positively correlated to the DTC price.*

I5: Average HbA1c level measures in HbA1c tests during the last 12 months

> *H5: The average HbA1c level is negatively[1] correlated to the DTC price.*

Arthrosis

I6: Can and does the hospital report the incidence of decubitus[2] amongst patients undergoing total hip surgery?

> *H6: The average DTC price of hospitals that report decubitus incidence is higher than the average DTC price of hospitals that do not report the incidence.*

I7: Reported decubitus incidence

> *H7: The decubitus incidence is negatively correlated to the DTC price*

Table 1: selected indicators and hypotheses

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[1] A high HbA1c level is an undesirable outcome since this is related to high glucose level fluctuations. The lower the HbA1c level, the better diabetes is under control.

[2] Bed sores or pressure ulcers, an unwanted, often post-operative, complication that is caused by continuous pressure or friction on the skin due to prolonged bed rest.

The selected quality indicators differ in nature. Some indicators are related to the hospitals administrative processes (I1, I3 and I6), other indicators to medical processes (I2 and I4) and other indicators to favourable or unfavourable outcome of a treatment (I5 and I7).

If all seven hypotheses are rejected, no evidence for a relationship between price and quality is identified. If one or more hypotheses are not rejected, then the results suggest that a relationship between price and quality does exist when comparing hospitals on price and quality.

4.3 Methods of data collection

By request, The Netherlands Health Care Inspectorate has provided all relevant quality information in a non-anonymous database. For all hospitals this database contained the scores for individual hospitals on all legally required quality indicators. The database has been made available without any restrictions on use. Information on DTC prices is retrieved from the website www.kiesbeter.nl on 11 and 18 October 2009. Of the selected DTCs almost all hospitals have their prices listed on this website. Hospitals from which the prices are not stated on the website are excluded from the analyses. Some hospitals have merged in the time period from 2007 (quality information) to 2009 (price information). If information on price and quality is available for identical entities, just under a different name, the hospitals remain in the database. If of a hospital combination only one price is listed, while quality information is only available for the two merger partners separately, these hospitals are excluded from the study. In total, information on 97 hospitals (over 95% of all hospitals in the Netherlands) is used for this research: 8 University Medical Centres (UMCs), 24 STZ[3] hospitals and 65

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[3] STZ stands for Samenwerkende Topklinische opleidingsZiekenhuizen (Collaborating Topclinical Teaching Hospitals). These large teaching hospitals form a group of its own. Larger and more specialised than general hospitals, but not as large and specialised as university hospitals.

general hospitals. On one occasion the website lists an incredible price (more than five standard deviations higher than the average price), presumably a typing error on the website. For this specific DTC for this hospital, the price has been adjusted after consulting the price list on the hospital's own website. All other price and quality information is used as provided by The Netherlands Health Care Inspectorate and the website www.kiesbeter.nl, without further validation.

4.4 Methods of data analysis

The data on quality, provided by The Netherlands Health Care Inspectorate in the form of a Microsoft Excel database has been imported in PASW Statistics 18 (formerly knows as SPSS). The data on price, retrieved from the website www.kiesbeter.nl has been manually added to this database, on order to create one database containing both quality and price data. Before examining the relationship between DTC price and the quality indicators, it has first to be established that all hospitals in the database can be treated as one group. In order to examine this, an analysis has been done to check whether or not price levels are dependent on the type of hospital (UMC, STZ or general hospital). ANOVA and t-tests are used to analyse price differences between hospital types. For one DTC all hospitals can be treated as one group, for the other DTC UMCs seem to charge a higher price, so the results of the analyses for this DTC are presented with all hospitals included as well as excluding UMCs. The relationship between quality indicators and prices are analysed using a t-test for yes/no type indicators (independent samples t-test for equality of means). In order to establish (un)equality of variance in the two groups, Levence's test for equality of variances (F-test) is used. The relationship between ratio type quality indicators and price is analysed using a Pearson product-moment correlation test. If the correlation is found to be significant, the nature of the relationship is further analysed by calculating the R^2 in a simple linear

regression analysis. For all analyses alpha has been set at 0.05. Since this level is rather arbitrary, the p-value for all tests is reported. All statistical analyses are done using PASW Statistics 18.

5. Results

5.1 Diabetes

Of the 97 hospitals in the database, 92 list the diabetes DTC price: 8 UMCs, 24 STZ hospitals and 60 general hospitals. 5 general hospitals do not have the diabetes DTC price listed. These are excluded from this analysis.

The average listed DTC price is € 644.54. The first somewhat surprising finding is the wide range of prices: the cheapest hospital offers the services for € 446.14, whilst the most expensive hospital charges € 1,315.05 for the same services.

To examine this difference, first an analysis is performed to see whether or not the price is dependent of the type of hospital. The prices for the different hospital categories are shown in table 2.

Diabetes DTC price for different types of hospitals

	N	Mean	Std. Dev.	Std. Error	95% Conf. Interval for Mean		Minimum	Maximum
					Lower Bound	Upper Bound		
UMC	8	637.3663	151.95531	53.72431	510.3284	764.4041	485.60	941.51
STZ	24	710.2850	184.33392	37.62700	632.4476	788.1224	463.30	1112.32
general	60	619.1918	181.42004	23.42123	572.3261	666.0576	446.14	1315.05
Total	92	644.5357	182.40553	19.01709	606.7605	682.3108	446.14	1315.05

Table 2: Diabetes DTC price characteristics for UMCs, STZ hospitals and general hospitals

Contrary to what one might expect, it are not the UMCs which offer the most expensive service, but the STZ hospitals. Given the vast range and the high standard deviation, however, these differences seem to be too small to indicate exclusion of one or more types of hospitals. This is confirmed by an ANOVA test: the differences are insignificant (F=2.201, p=0.117). The level of association between hospital type and DTC price is low (η=0.217). These findings indicate that for further analysis, making a distinction in hospital type is not required. The hospitals are further analysed as one large group of 92 hospitals.

The first analysed indicator is 'Can and does the hospital report the percentage of patients who's retinas have been checked by or under supervision of an ophthalmologist?'. Of the 92 hospitals, 79 hospitals report a percentage, 13 hospitals do not. Although the average DTC price is slightly higher for hospitals that do report a percentage (€ 645.32) than for hospitals that fail to report a percentage (€ 639,74), a t-test for equality of means shows that this minor difference is insignificant (t=-0.102, p=0.919)[4]. The first hypothesis can therefore be rejected. Whether or not a hospital is able to report the percentage of diabetes patients that undergoes a retina check is not reflected in the DTC price.

The next indicator that is analysed is 'Percentage of patients that underwent a retina check by or under supervision of an ophthalmologist in the past 12 months'. For the 79 hospitals that report a percentage, this percentage is compared to the DTC price. Figure 1 shows a visual representation of the relationship between the percentage of patients that have their eyes checked and the DTC price.

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[4] The t-test results for 'equal variances assumed' are reported here, since Levence's test for equality of variances shows no significant difference in variance (F=0.403, p=0.527).

Percentage of patients that undergo a retina check and diabetes DTC price
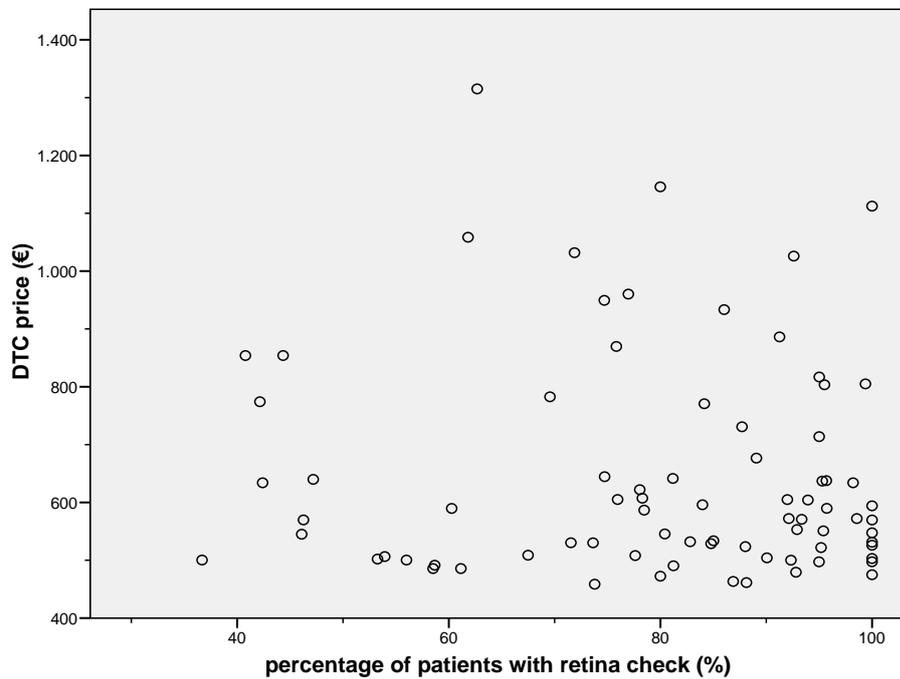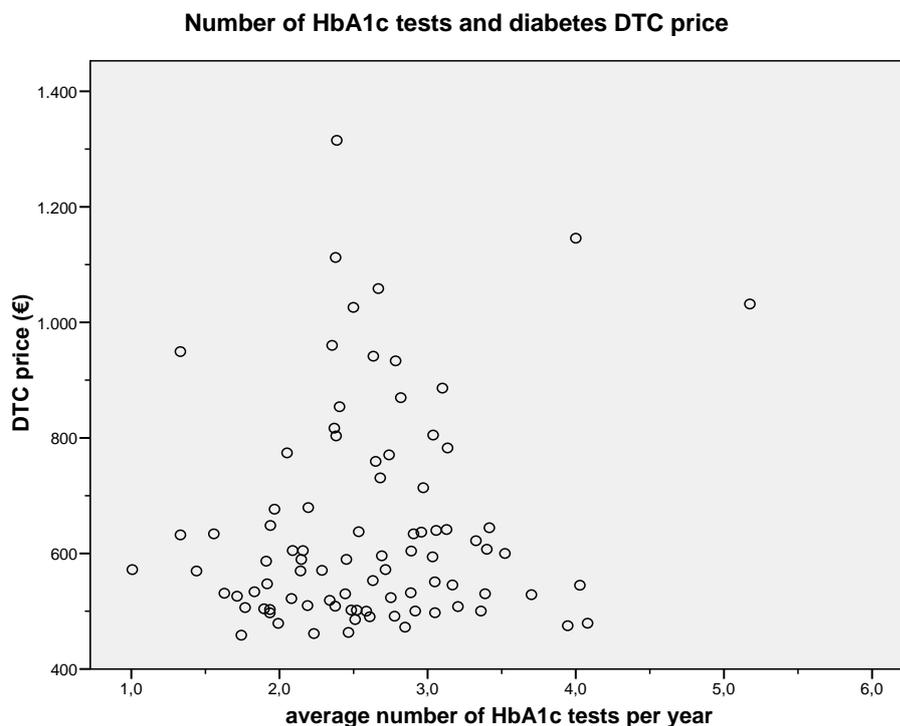

Figure 1: Scatter plot of the percentage of patients that undergo a retina check and the diabetes DTC price

The findings are analysed using a Pearson product-moment correlation test. As figure 1 suggests, the Pearson product-moment correlation test reveals that there is no significant correlation between the percentage of patients that have their eyes checked and the DTC price (r=-0.079, p=0.491). It is surprising to find a negative value for the Pearson product-moment correlation coefficient, since this suggest that the better a hospital performs (higher percentage of eye checks), the lower the price. Since the correlation coefficient is very close to zero and insignificant (p=0.491) the sign of the correlation coefficient can be ignored. There is no use in determining the direction of a non-existing relationship. Since the Pearson product-moment correlation test shows that there is no significant correlation between the percentage of patients that have their eyes checked and the DTC price, the second hypothesis can be rejected.

The third indicator that is analysed is 'Can and does the hospital report the number of HbA1c tests and their outcome?'. Of the 92 hospitals, 87 report on HbA1c testing, 5 do not. Surprisingly, the average DTC price for the hospitals that do not report on this indicator is slightly higher (€ 677,20) than for hospitals that do report on this indicator (€ 642,66), but this difference is negligibly low as a t-test for equality of means shows (t=0.410, p=0.683)[5]. This indicator is of no influence on the DTC price. The third hypothesis is rejected.

The fourth indicator that is analysed is 'Average number of HbA1c tests given to patients in the last 12 months'. Figure 2 shows the relationship between this number and the DTC price.

Number of HbA1c tests and diabetes DTC price

Figure 2: Scatter plot of the average number of HbA1c tests per patient per year and the diabetes DTC price

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[5] idem (F=0.344, p=0.559).

The findings are analysed using a Pearson product-moment correlation test. As figure 2 suggests, the Pearson product-moment correlation test results shows that there is no significant correlation between the average annual number of HbA1c tests and the DTC price ($r=0.134$, $p=0.215$). Hypothesis 4 is therefore rejected.

The last diabetes related indicator that is analysed is the first outcome indicator: the average HbA1c level in HbA1c tests during the last 12 months. This parameter is an indicator for the stability of glucose levels in the blood of patients. Generally speaking, the lower the value, the better the results. Figure 3 shows the relationship between the average HbA1c level and the DTC price.
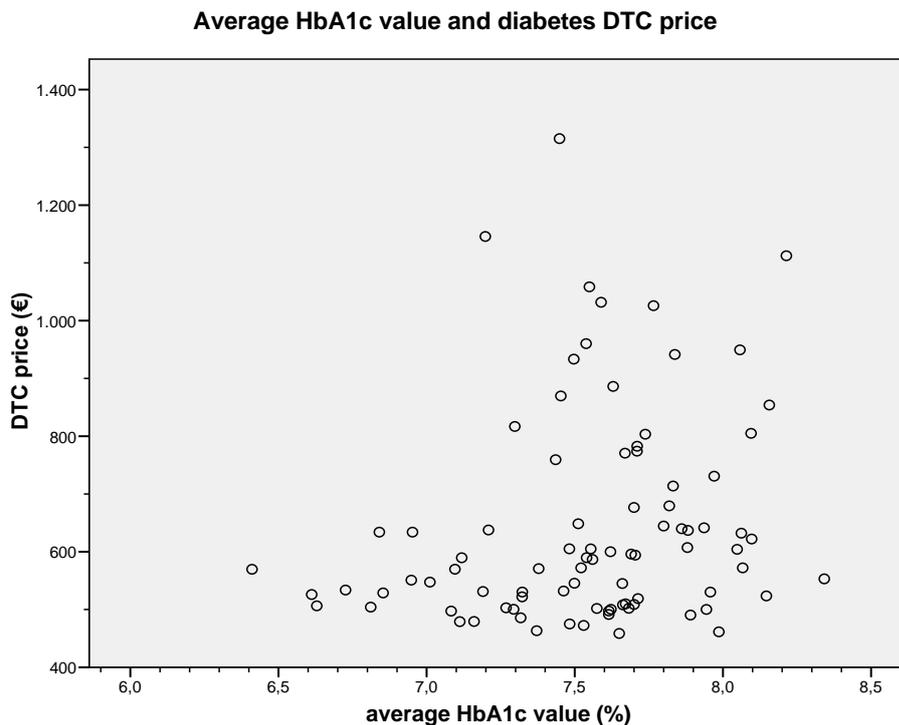

Figure 3: Scatter plot of the average HbA1c value and the diabetes DTC price

Contrary to what one might expect, figure 3 seems to suggest that there is a positive relationship between the HbA1c level and the DTC price instead of a negative. In other

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words: the higher the HbA1c level, so the less favourable the outcome, the higher the price. A Pearson product-moment correlation test shows this relationship to be significant (r=0.215, p=0.046). Since this relationship is found to be significant, the relationship is further analysed by performing a regression analysis. This analysis shows that, although significant, very little of the variation in DTC price is HbA1c variation related (R^2=0.046). Since the explanatory power of the regression is so low, the correlation can be ignored, despite the fact that it is significant. However the results of the statistical analysis are interpreted (positive correlation accepted as an existing significant relationship, or positive correlation to be ignored because of the low explanatory power of the independent variable HbA1c), hypothesis 5 is rejected, since this hypothesis includes a direction of the relationship contrary to the findings.

For diabetes, all hypotheses are rejected. In the data no evidence can be found for a relationship between price and quality.

5.1 Arthrosis, total hip surgery

Of the 97 hospitals in the database, 90 list the DTC price for total hip surgery: 8 UMCs, 24 STZ hospitals and 58 general hospitals. 7 general hospitals do not have the hip surgery DTC price listed. These are excluded from this analysis.

The average listed DTC price is € 10,728.92. There is virtually no difference in average DTC price between general (€ 10,675.58) and STZ hospitals (€ 10,678.75). UMCs do charge higher prices (average DTC price € 11.266,12), as shown in table 3.

Arthrosis / Total hip surgery DTC price for different types of hospitals

	N	Mean	Std. Dev.	Std. Error	95% Conf. Interval for Mean		Minimum	Maximum
					Lower Bound	Upper Bound		
UMC	8	11,266.1200	1,285.3112	454.4261	10,191.5729	12,340.6671	9,462.32	12,826.04
STZ	24	10,678.7538	1,005.5600	205.2591	10,254.1430	11,103.3645	8,963.83	13,437.72
general	58	10,675.5798	945.8602	124.1975	10,426.8786	10,924.2811	8,633.96	13,580.65
Total	90	10,728.9187	996.3409	105.0236	10,520.2391	10,937.5982	8,633.96	13,580.65

Table 3: Arthrosis / Total hip surgery DTC price characteristics for UMCs, STZ hospitals and general hospitals

The observed difference is first analysed by means of ANOVA. The ANOVA test shows the observed difference to be insignificant (F=1.285, p=0.282). Since the difference between general and STZ hospitals is virtually non-existent, it could be argued that subdividing the hospitals in three groups is not valid, so the STZ hospitals and general hospitals are pooled and the difference is re-examined using a t-test for equality of means, dividing the hospitals into two groups: UMCs and non-UMCs. Again the difference is found to not be significant (t=-1.612, p=0.111)[6]. One could argue that these tests (ANOVA and t-test for difference in means) are not valid, since the group of UMCs do not represent a larger population: there are only eight UMCs in the Netherlands, so any observed difference could be relevant, even if the difference is not statistically significant. For the further analyses therefore the test results are given for all hospitals, including UMCs, and for the hospitals excluding UMCs.

The first indicator under examination for the total hip surgery DTC is 'Can and does the hospital report the incidence of decubitus amongst patients undergoing total hip surgery?' (related to hypothesis 6). Of the 90 hospitals included in this analysis, 84 meet the criterion and 6 do not. The difference in average DTC price between these groups is very small: € 10,726.29 for hospitals that do report decubitus incidence and € 10,760.13 for hospitals that do not report the percentage. The observed difference seems to be negligible. A t-test for

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[6] idem (F=1.059, p=0.306)

equality of means confirms that the observed difference is insignificant (t=0.079, p=0.937)[7].

With the UMCs excluded, the observed price difference is somewhat larger (€ 10,681.54 for

hospitals that do report and € 10,578.45 for hospitals that do not report), but still insignificant

(t=-0.209, p=0.835)[8]. Hypothesis 6 is rejected.

Looking closer at the hospitals that do report the decubitus incidence (n=84), the relationship

between decubitus incidence and DTC price is examined. The findings are presented in figure
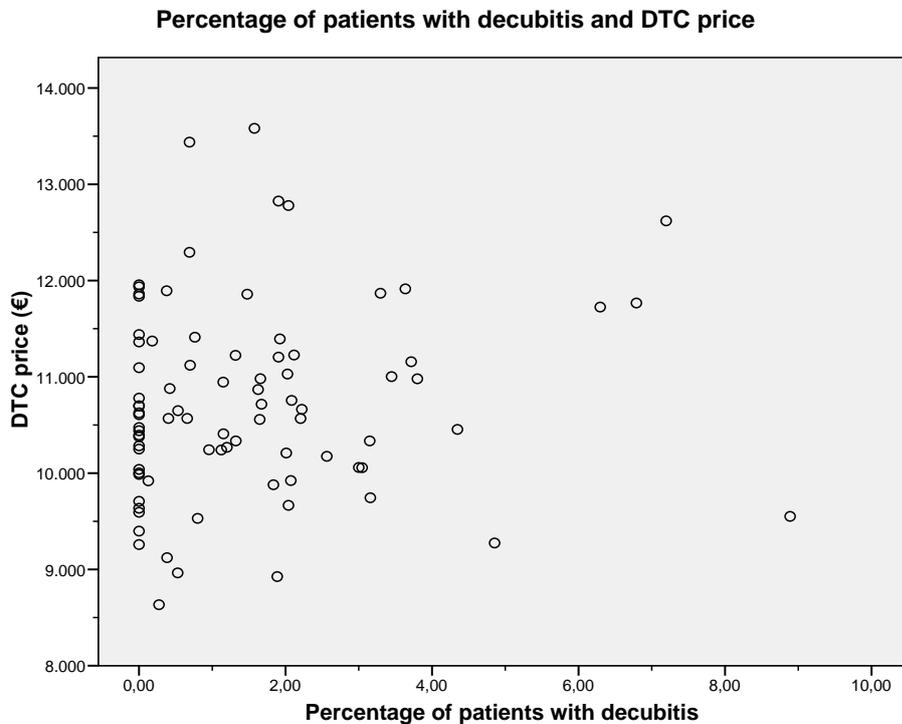
4.

Figure 4: Scatter plot of decubitus incidence and the arthrosis / total hip surgery DTC price

The graph does not suggest a relationship to exist between the prevalence of decubitus and the

DTC price. A Pearson product-moment correlation test confirms this finding (r=0.120,

p=0.276). Excluding UMCs from the analysis, the findings are similar (r=0.132, p=0.251).

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[7] idem (F=0.078, p=0.780)
[8] idem (F=1.602, p=0.209)

Hypothesis 7 is therefore rejected. For arthrosis / total hip surgery, both hypotheses are rejected. The data provides no evidence for a relationship between price and quality to exist.

Neither for diabetes, nor for arthrosis / total hip surgery, any relationship between price and quality can be found.

6. Discussion

6.1 Internal validity

For this research, 2007 hospital performance data are used. 2007 is one of the first years in which hospitals had to report on quality (IGZ, 2009). As also indicated by several academic publications (see section 3.3.3), in 2007 the Dutch system of quality measurement and reporting was still in its infancy. Hospitals use different sources for their indicators and some hospitals define indicators differently. For example, as sources for determination of HbA1c levels some hospitals use laboratory data, other hospitals use electronic patient files. Some hospitals use information of all patients, while other hospitals use a sampling method. Some hospitals report on all diabetes patients, while other hospitals report on diabetes type I only. Also, the process of validation was by then not fully developed and operational. To compare hospitals' performance based on indicators that are not fully reliable and uniform is at least tricky. However, this research does not aim to determine which hospitals are performing the best. It aims to determine to what extent quality as measured by the quality indicators is reflected in DTC price levels. When negotiating on price, insurers and hospitals use these indicators, albeit that they are not fully reliable. Therefore, the internal validity of this research is fairly high. As inaccurate as the quality measures may be, these are the quality indicators that are to play a role in the negotiations. The conclusion that for the chosen DTCs no evidence is found that quality is reflected by DTC price seems to be valid.

6.2 External validity

When assessing the external validity of this research two questions are of importance. (1) Can the results be extrapolated to the entire Dutch hospital sector? and (2) are the chosen DTCs sufficiently representative of all DTCs, so that conclusions can be extended beyond the diagnoses diabetes and arthrosis? The first question is relatively easy to answer. Since virtually all hospitals are included in this research, is it safe to extrapolate the results to the entire Dutch hospital sector. The second questions is somewhat harder to answer. The DTCs and the performance indicators have been carefully selected. Performance indicators are chosen from a relatively small group of indicators, developed in the first phase of implementation of the public reporting system (CBO/Orde, 2007). If any indicators are to be used, than the indicators with the longest history of development and refinement are logical choices. The selected DTCs are frequently used DTCs (each over 15,000 per year), so professionals are familiar with the DTCs and the performance indicators that are associated to these DTCs. Furthermore a mixture of process and outcome indicators are included in the research. Since the results are quite clear – no relationship can be found whatsoever – it is fair to expect similar results for different DTCs. Is it, however, not impossible that a relationship between price and quality can be found in other medical specialities of for other DTCs. This would require expansion of the research to e.g. other medical specialties or diagnoses. Another topic that needs to be addressed is the chosen methodology. The conclusion that no relationship can be found between price and quality (for diabetes and total hip surgery), does not automatically imply that health care providers only compete on price and that incentives to improve quality are absent. This question is further addressed in the next section.

6.3 Interpretation of results

At a first glance, one would easily be tempted to interpret the results quite cynically.

Apparently, there is no relationship whatsoever between price and quality in the Dutch

hospital market. There doesn't seem to be an incentive to increase quality of care for

healthcare providers, since better quality does not seem to be resulting in higher prices. Or the

other way around, higher prices do not lead to increased quality. It is tempting to conclude

that hospitals compete on and negotiate about price alone and that quality still has no place in

the negotiations on DTCs between health care providers and insurance companies. One could

be tempted to believe that without a course correction, the Netherlands healthcare sector is to

follow the United States hospital care market example, where hospitals predominantly

compete on price and where quality seems to be no part of the equation as described by Porter

and Teisberg (2006).

The chosen research method, however, has certain limitations. These limitations are caused

by the choice for cross sectional research as opposed to longitudinal research and by the

absence of qualitative aspects in the research. By choosing for a cross sectional analysis,

hospitals can only be compared amongst one another. It is possible, and not illogical, that a

given hospital is able to negotiate a higher price than in the previous year because it realised a

significant increase in quality or that the insurance company has promised a premium for next

year if certain improvements are implemented. Each hospital has its own cost structure.

Higher prices can be caused by recent investments in the building or other factors that have

not been analysed. In order to conclude with greater certainty that there is no relationship

between DTC price and quality, a longitudinal study is called for: does price increase as

quality increases over time? This research is too limited in its nature to reach the conclusion

that quality is not reflected in DTC price. One can only conclude, that when comparing

different hospitals, a higher price does not imply better quality, at least for total hip surgery and diabetes.

This research only examines the outcome of the negotiation process: the DTC price level. In order to determine the role that quality plays in negotiations between hospitals and insurance companies, a more qualitative approach might be called for: interviews with stake holders or observations during the negotiation process might provide more insight in the process than only measuring the outcome of the negotiations as done in this research.

Although this study is not able to detect any evidence of a relationship between price and quality, it would go too far to conclude that such a relationship does not exist at all.

7. Conclusions and recommendations

The data suggest that, when comparing different hospitals in the Netherlands, there is no relationship between price and quality. A higher DTCs price does not imply better quality, at least for the diagnoses diabetes and arthrosis. Although the study includes the entire Dutch hospital sector, there are limitations with respect to external validity. In this research only two DTCs are analysed. For these DTCs, no evidence of a relationship between price and quality is found. Given the thorough selection of the DTCs and related quality indicators, it is plausible that no evidence for a relationship between price and quality will be found, even if the scope of the research would be widened to other DTCs. Although plausible, the level of certainty for the external validity is too limited to draw conclusions beyond the diagnoses diabetes and arthrosis. In order to reach sufficient certainty, the study should include more DTCs.

The fact that quality is not related to price when comparing different hospitals, does not automatically imply that quality does not play a role in the negotiations. The evidence is insufficient to conclude that insurance companies do not act as prudent buyers of healthcare, aiming for both cost reduction and quality improvement. To further investigate the matter, the research could be extended to a longitudinal approach to examine the effects that quality improvements have on price level. By doing so, the intra-hospital effects of quality change would be investigated rather that the inter-hospital difference in this study.

Furthermore, the study would become much more insightful, if qualitative elements would be included in the study to address the question what role quality plays in the negotiation process.

At this point the conclusion is limited to: 'When Dutch hospitals are compared on DTC price and quality as measured by national performance indicators, no evidence of a relationship between price and quality can be found, at least for the diagnoses diabetes and arthrosis.'

8. References

Blumenthal, D. (1996a) The Origins of the Quality-of-Care Debate. *The New England Journal of Medicine* 335 (15): 1146-1149.

Blumenthal, D. (1996b) Quality of Care – What is it? *The New England Journal of Medicine* 335 (12): 891-894.

Blumenthal, D., Epstein, A.B. (1996) The Role of Physicians in the Future of Quality Management. *The New England Journal of Medicine* 335 (17): 1328-1331.

Brook, R.H., McGlyn, E.A., Cleary, P.D. (1996) Measuring Quality of Care. *The New England Journal of Medicine* 335 (13): 996-970.

Campbell, S., Reeves, D., Kontopantelis, E., Middleton, E., Sibbald, B., Roland, M. (2007) Quality of Primary Care in England with the introduction of Pay for Performance *The New England Journal of Medicine* 357 (2): 181-190.

Campbell, S.M., Reeves, D., Kontopantelis, E., Sibbald, B., Roland, M. (2009) Effects of Pay for Performance on the Quality of Primary Care in England *The New England Journal of Medicine* 361 (4): 368-378.

CBO/Orde (2007) *Kwaliteit van Zorg in de Etalage. Realiseren van transparantie over de effectiviteit en veiligheid van medisch-specialistische zorg. (Quality of Care in the Schowcase. Realisation of transparency of effectiveness and security of care provided by medical*

specialists.) Utrecht: CBO Kwaliteitsinstituut voor de Gezondheidszorg / Orde van Medisch Specialisten (CBO Quality Institute for the Healthcare Sector / Order of Medical Specialists).

Chaix-Couturier, C., Durand-Zaleski, I., Jolly, D., Durieux, P. (2000) Effects of financial incentives on medical practice: results from a systematic review of the literature and methodological issues. *International Journal for Quality in Health Care* 12 (2): 133-142.

Chassin, M.R. (1996) Improving the Quality of Care. *The New England Journal of Medicine* 335 (14): 1060-1063.

Chassin, M.R., Hannan, E.L., DeBuono, B.A. (1996) Benefits and Hazards of Reporting Medical Outcomes Publicly. *The New England Journal of Medicine* 334(6): 394-398.

Custers, T., Arah, O.A., Klazinga, N.S. (2006) Is there a business case for quality in The Netherlands? A critical analysis of the recent reforms of the health care system. *Health Policy* 82: 226-239.

Dückers, M., Makai, P., Vos, L., Groenewegen, P., Wagner, C. (2009) Longitudinal analysis on the development of hospital quality management systems in the Netherlands. *International Journal for Quality in Health Care* 21(5): 330-340.

Enthoven, A.C., Van de Ven, W.P.M.M. (2007) Going Dutch – Managed-Competition Health Insurance in the Netherlands. *The New England Journal of Medicine* 357 (24): 2421-2423.

Epstein, A.M., Lee, T.H., Hamel, M.B. (2004) Paying Physicians for High-Quality Care. *The New England Journal of Medicine* 350 (4): 406-410.

Epstein, A.M. (2007) Pay for performance at the Tipping Point. *The New England Journal of Medicine* 356 (5): 515-517.

Hannan, E.L., Kilburn, H., Racz, M., Shields, E., Chassin, M.R. (1994) Improving the Outcomes of Coronary Artery Bypass Surgery in New York State. *JAMA*, *the Journal of the American Medical Association* 271(10): 761-766.

Helderman, J., Schut, F.T., Van der Grinten, T.E.D., Van de Ven, W. (2005) Market-Oriented Health Care Reforms and Policy Learning in the Netherlands. *Journal of Health Politics, Policy and Law* 31 (1-2): 189-209.

Hendriks, M., Spreeuwenberg, P., Rademakers, J., Delnoij, D.M.J. (2009) Dutch healthcare reform: did it result in performance improvements of health plans? A comparison of consumer experiences over time. *BMC Health Services Research* 9: 167-176.

IGZ (2009) *Staat van de gezondheidszorg 2009, de vrijblijvendheid voorbij. (The state of healthcare 2009, beyond permissiveness.)* Utrecht: Inspectie voor de Gezondheidszorg, IGZ (Netherlands Health Care Inspectorate).

Jacobs, D.O. (2009) Variation in Hospital Mortality Associated with Inpatient Surgery – An SOS. *The New England Journal of Medicine* 361 (14): 1398-1400.

Knottnerus, J.A., Ten Velden, G.H.M. (2007) Dutch Doctors and Their Patients – Effects of Health Care Reform in the Netherlands. *The New England Journal of Medicine* 357 (24): 2424-2426.

Lee, T.H. (2007) Eulogy for a Quality Measure. *The New England Journal of Medicine* 357 (12): 1175-1177.

Lindenauer, P.K., Remus, D., Roman, S., Rothberg, M.B., Benjamin, E.M., Ma, A., Bratzler, D.W. (2007) Public Reporting and Pay for Performance in Hospital Quality Improvement. *The New England Journal of Medicine* 356 (5): 486-496.

Marshall, M., Smith, P. (2003) Rewarding results: using financial incentives to improve quality. *Quality and Safety in Health Care* 12: 397-398.

NHS (2008) *High Quality Care For All, NHS Next Stage Review Final Report*. London: TSO.

NZa (2007) *Monitor Ziekenhuiszorg 2007. Analyse van de marktontwikkelingen in het B-segment in 2007. (Monitor Hospital Care 2007. Analysis of market developments in the free segment in 2007).* Utrecht: NZa.

NZa (2008a) *Monitor Ziekenhuiszorg 2008. Analyse van de marktontwikkelingen in het B-segment in 2008. (Monitor Hospital Care 2008. Analysis of market developments in the free segment in 2008).* Utrecht: NZa.

NZa (2008b) *Monitor Najaarsrapportage 2008. Prijsontwikkelingen ziekenhuiszorg 2008. (Monitor 2008 Fall report. Price developments hospital care 2008).* Utrecht: NZa.

NZa (2009) *Why a Healthcare Authority?* http://www.nza.nl/27502/27507/27521 [accessed 24 September 2009].

Porter, M.E., Teisberg, E.O. (2006) *Redefining Health Care. Creating Value-Based Competition on Results.* Boston: Harvard Business School Press.

Schut, F.T., Van de Ven, W.P.M.M. (2005) Rationing and competition in the Dutch health-care system. *Health Economics* 14: S59-S74.

Robinson, J.C. (2001) Theory and Practice in the Design of Physician Payment Incentives. *The Milbank Quarterly* 79 (2): 149-177.

Roland, M.R. (2004) Linking Physicians' Pay to the Quality of Care – A Major Experiment in the United Kingdom. *The New England Journal of Medicine* 351 (14): 1448-1454.

Rosenthal, M.B. (2009) What Works in Market-Oriented Health Policy? *New England Journal of Medicine* 360 (21): 2157-2160.

Van de Ven, W.P.M.M., Schut, F.T. (2009) Managed Competition in The Netherlands: still work in progress. *Health Economics* 18: 253-255.

Vonnegut, M. (2007) Is Quality Improvement Improving Quality? A View from the Doctor's Office. *The New England Journal of Medicine* 357 (26): 2652-2653.

Wester, G., Burgers, J., Verkleij, H. (2009) The Netherlands: regulated competition behind the dykes? *British Medical Journal* 339: 839-842.

Zorgverzekeraars Nederland (2007) *DBC-inkoopgids 2008, Segment B, Kwaliteit als kompas bij de inkoop van zorg. (DTC Buyers Guide 2008. Free Segment, Quality as a compass for purchasing healthcare.)* Houten: Zorgverzekeraars Nederland.