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## Using Electronic Auctions to Improve Market Performance in Health Care

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### Abstract

*Electronic auctions can be applied in certain health care markets, but the effects on market structure, market behavior and market performance are unclear. We analyzed the effects of a reverse electronic auction initiative that was implemented by a new intermediary (CareAuction.nl) in the market for maternity care in the Netherlands in 2005 and 2006. We found small but significant effects on the price of maternity care (minus 2-4%), and significant effects on market structure (more care providers involved in the bidding processes) and market behavior (bidding behaviors and user preferences). We see good opportunities to improve health care market effectiveness for specific care services (non-emergency, elective, standardized care) and to further adapt the auction mechanism.*

**Keywords:** Auction, Health Care, Market Performance, Intermediation

## 1 Introduction

The health care sector is a large industry in many Western countries. For instance, health care expenditures in the US economy are nearly two trillion dollars per year (Smith et al., 2006). Markets play an important role in the delivery and financing of health care in the US (Gaynor, 2005) and UK (Propper, 2003). Market-oriented healthcare reforms are being considered or enacted by many countries where policymakers have to decide on reforms and regulation, including competition law, while courts and competition regulators have to make decisions about firms in health care markets (Gaynor, 2005). A key reform objective in the European health-care systems over the last two decades has been to make the health-care system more demand-oriented (Kerzman et al, 2003).

Health care markets exist between users of care (patients or clients), providers of care (e.g., doctors and hospitals), and purchasers of care (e.g., insurance companies) (Propper, 2003). Auctions might play a positive role in matching the demand and offering of care in these markets, offering opportunities to address the vexing concern of ever increasing health care costs and keeping these costs under some control. The electronic auction mechanism might serve as a potential solution in national health care policy dilemma's.

CareAuction.nl (in Dutch: Zorgveiling.nl) is a recent private initiative in the maternity care sector in the Netherlands: about 30% of all maternity care was contracted through CareAuction.nl by the end of 2006. CareAuction.nl has changed the market relationship between care providers and insurance companies in two distinct ways. First, CareAuction.nl is based on individual transactions for each customer requesting maternity care, in stead of contracting the total volume of maternity care per year in one contract per provider. Second, CareAuction.nl enables an electronic auction process where multiple providers can bid on one customer request.

In this paper, we analyze the influence of the auction principle and more specifically, the electronic auction, on health care markets. Our aim is to assess if and how auctions can help to improve health care systems. Our research method consists of a critical retrospective analysis of one case, based on structured interviews with different actors involved in the changing care market, experiencing the effects of the electronic auction system (Klein and Myers, 1999).

We first review auction mechanisms, compare these to the tender system and negotiations, and introduce the model by Sheperd (1985) to analyze effects of external determinants (like electronic auctions) on market structure, market behavior, and market performance (section 2). The research approach is given in section 3. Sections 4 and 5 present the analysis of the effects of CareAuction on the maternity care market in the Netherlands using the Shepherd model. Conclusions are given in section 6.

## **2 Auctions, Tenders, Negotiations, and Markets**

A standard or non-Web auction has been defined as “a market institution with an explicit set of rules determining resource allocation and prices on the basis of bids from the market participants” (McAffee and McMillan, 1987). The buyers (bidders) in the auction determine the price for the resource (product or service) and the seller determines the rules of the auction. In contrast, in a ‘reverse auction’, the sellers of a good or service determine the price and the buyers determine the rules of the auction.

Auctions take more time to execute than market transactions based on fixed prices, but are faster than negotiations, where every bid and re-bid have to be evaluated. Negotiations go on until the parties reach agreement. Bidders in an auction continue bidding until no bidder wants to bid a higher price and ‘wins the auction’ if this price is at least better than a threshold or minimum price (‘reserve price’) (Bulow and Klemperer, 1996). The differences between auctions and negotiations are also visible in web sites as [www.ebay.com](http://www.ebay.com) and [www.marktplaats.nl](http://www.marktplaats.nl). On eBay, buyers bid until the highest bid wins the auction, and the winning bidder has the obligation to buy the product for the winning price. Winning the auction on Marktplaats does not mean that the bidder has the obligation to buy, but the seller is informed that someone is interested in the product, after which negotiations can start.

Tenders and auctions are related mechanisms. Since 2004, the European Union allows the use of electronic auctions to call for tenders (EU, 2004). Before the auction is started, the auctioning firm has issued a call for tender, has evaluated all tender proposals and has invited the bidders that meet the criteria to the auction (Plattel, 2006).

### **2.1 Auction mechanisms**

Basically, an auction is a market mechanism to match supply and demand of a specific product or service, where one or more customers (bidders) meet one or more suppliers (Van Heck and Ribbers, 1998). The auction mechanism defines whether bids will be (i) increasing or decreasing, (ii) simultaneous or sequential, and (iii) open or closed. Also, the mechanism determines when and how the auction stops, how bids are compared, how

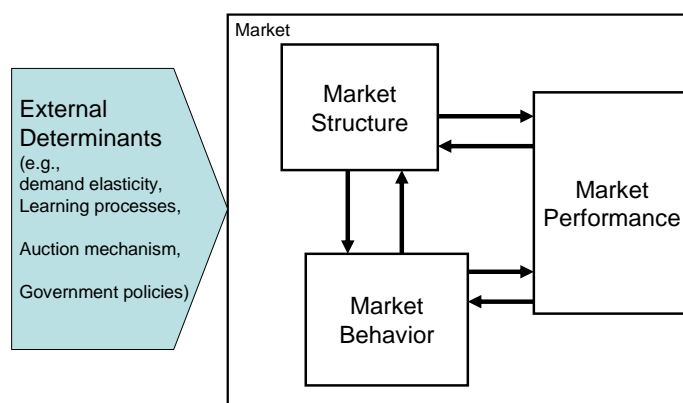
the price is determined, and how the goods are allocated to the winning bidders (Sashi and O’Leary, 2002).

The standard auction mechanism is the *English auction* or the Ascending Price auction, as described above. The seller starts the bidding at a minimally acceptable point usually called the reserve price and the buyers bid higher and higher until no one is willing to go any higher. The buyer with the highest bid wins the item. Another commonly used auction format is the *Dutch auction* where bids don’t rise, but decrease. The seller offers a product against a high price, and lowers the price until one buyer accepts the price (by saying ‘mine’). When this mechanism is used to sell multiple items of the same article, this is referred to as a ‘discriminatory price auction’. In this auction mechanism, bids are sorted from high to low and the items are allocated to the highest bids until no item is left. Other single item auction types (‘Vickrey auctions’) are characterized by the rules to choose the winning bid: ‘first price auctions’ (best bid wins the auction) and ‘second price auctions’ (second best bid wins). A special auction mechanism is the ‘*reverse auction*’ where the buyer “controls” the market because an item is being requested that is offered by a number of sellers. The price offered by the sellers continues to decrease until a theoretical rational market price is achieved and the (single) buyer accepts the bid of one of the sellers (Smeltzer and Carr, 2003).

## 2.2 Effects of Auctions on Markets

Markets are not primarily economic allocation mechanisms but also social institutions that facilitate exchange of goods or services by means of competition (Shepherd, 1985; Koppius, 2002). Auctions and, more specifically the auction mechanisms (the ‘design of the auction processes) can have various significant effects on markets (see e.g. Kambil and Van Heck 1995, Van Heck and Ribbers, 1998; Sashi and O’Leary, 2002).

In this paper we use the model by Shepherd (1985) (Figure 1) to analyze the effects of auctions on market structure (MS), market behavior (MB), and market performance (MP). Shepherd distinguishes four factors: MS, MB, MP and external determinants (ED), where MS influences MB, and MS and MB influence MP. Additionally, there is ‘feedback’ influence since MB influences MS and MP influences MB and MS. Additionally, MS, MB, and MP are influenced by ED (e.g., demand elasticity, learning processes, and government policies).



**Figure 1. External determinants influence Market Structure, Behavior and Performance (based on Shepherd, 1985)**

Examples of the effects of auctions on market structure are (i) emergence of intermediary organizations that provide bidding information services to buyers or sellers, and (ii) rules

that enforces buyers to be in a specific (virtual or real) bidding room to join the bidding. These effects can cause auction costs (an indicator of market performance) to increase, thereby creating an entry-barrier for auction participation (market behavior) (Kambil and Van Heck, 1995). Auctions can also affect market behavior if, for instance, buyers can observe the bidding behavior of other buyers (in an auction room) and use the information in the bidding strategy. Similarly, buyers in electronic auctions can exchange information outside the auction system (Smeltzer and Carr, 2003).

Auctions can have various effects on market performance. Reverse auctions tend to lead to lower prices and faster transactions if compared to the standard Request for Quote (RFQ) used in industrial markets. In a RFQ, sellers make bids on a request by a buyer (Smeltzer and Carr, 2003). Bulow and Klemperer (1996) showed that English auctions results in the lowest prices and Kambil and Van Heck (1995) showed that the Dutch auction results in many transactions per hour (also due to the high bidding speed, enforced by the bidding clock) and can result in higher prices.

### **2.3 Electronic Auctions and Electronic Markets**

The previous section summarized effects of classical (non-electronic) auctions on classical (non-electronic) markets. Electronic markets are defined as inter-organizational information systems that allow the participating buyers and sellers to exchange information about prices and product offerings. An electronic auction brings the buyers and sellers together via some type of electronic media, usually the Internet (Van Heck and Ribbers, 1998). More specifically, the European Union defines an electronic auction for tenders as “a repetitive process involving an electronic device for the presentation of new prices, revised downwards, and/or new values concerning certain elements of tenders, which occurs after an initial full evaluation of the tenders, enabling them to be ranked using automatic evaluation methods” (EU, 2004).

Unlike classical auctions, electronic auctions facilitate the use of multiple criteria simultaneously to evaluate bids, meaning that the auctioneer can aim to reach the best possible price, quality, delivery time, continuity of services, and other performance indicators in one auction (Van Heck and Ribbers, 1997; Hakamis et al, 2003).

Electronic auctions affect the market structure because they can influence the number of market participants: numbers can increase when market accessibility improves and numbers might decrease if high (IT) investment are needed for market participants (entry and exit barriers). Market behavior can be influenced because more market information can be made available to all or some market participants (information (a-) symmetry), and because multiple transactions can be used to exchange smaller batches, for specific buyer groups, either sequentially or simultaneously. Market performance can be influenced because electronic auctions can lead to lower transaction costs, more transactions per hour, and more complex transactions can be executed because of the use of auction-robots (Pinker et al, 2003).

Electronic markets can influence the products, because the smaller batch sizes enable more product varieties (in price and qualities) and more customization. On the other hand, high asset specificity (the product is only useful for a small customer group) hinders the market to function well, because complex product descriptions require more communication and information exchange, thus incurring higher market costs and higher preferences for direct contacts between buyer and seller (Malone et al, 1987)

### **2.4 Auctions and Markets in Health Care**

Auctions are relatively unknown in health care. Some initiatives that resemble CareAuction.nl are [www.medicineonline.com](http://www.medicineonline.com) where the reverse auction mechanism is

used for cosmetic surgery services. Patients (customers) can put their request for surgery online and surgeons bid by listing a price and quality indicators such as their educational background, experience, and surgical facilities. Other examples of auctions in health care are related to non-treatment activities, such as a Dutch hospital that uses an auction to outsource sterilization services (achieving 30% cost reduction), or a group of hospitals that outsource their copying services, or hospitals that use auctions to purchase office supplies and surgical gloves ([www.nvilg.nl](http://www.nvilg.nl) 2003, 2004).

### **3 Research Approach**

Electronic markets can be evaluated from many perspectives. Driedonks et al (2005) distinguish between five types of electronic markets research.

- Analysis of the development of a market over time: changes in structures, roles, and functions of intermediaries (the ‘institutional view’ on markets),
- Analysis of (electronic) markets in comparison to other (electronic) coordination mechanisms for demand and supply of products or services,
- Analysis of differences between processes in electronic and non-electronic markets and the effects on market performance (e.g. price formation),
- Analysis of factors that drive or hinder adoption and development of successful market systems,
- Case analysis of successes and failures of electronic markets.

Our research combines the first two types of research: we analyzed the developments of the market for maternity care services over a period of 1.5 year (2005-2006) since the introduction of a new intermediary ‘CareAuction.nl’ and the simultaneous introduction electronic auction mechanism in March 2005.

We adopted a qualitative case-based research approach, which has been suggested as appropriate research strategy to separate a phenomenon (market performance) from its context (market context, structure, and behavior) (Yin, 1994). Our research data are (i) the CareAuction usage statistics (made available for us in the CareAuction transaction databases), (ii) background materials being the NIVEL report with an analysis of the maternity care sector (Lamkaddam and Wiegers, 2004), the analysis of the CareAuction application by the Dutch Government (Zorgautoriteit, October 2006), and (iii) face to face interviews with care providers (four CEOs of maternity care organizations), care purchasers (two senior managers in two large health insurance companies that purchase maternity care for their clients), and the CEO of CareAuction.nl. Each interview took about 90 minutes and was based on a set of open questions on changes in:

- Market structure. Example questions are “which market participants were involved” and “how were demand and supply matched”, “what is the role of patients?” before and after using CareAuction; (how) did the relations change between care providers and insurance companies? Did market transparency and accessibility change and improve?” ,
- Market behavior. Example questions are “has CareAuction influenced your business operations? How do you evaluate the performance of CareAuction? Does CareAuction offer sufficient opportunities to show your specific product or service? Are you satisfied with its current quality evaluation system? Why did you choose to use CareAuction? How do customers (patients) receive the benefits (lower costs) of CareAuction? How many customers (patients) know that CareAuction is used to purchase their care?”
- Market performance. Example questions are “how much time (costs) is needed to use CareAuction (and is this more or less than before)? What are the (dis-) advantages of using CareAuction? Did you experience advantages of using

CareAuction (improved productivity of available care resources? Less paperwork? Easy contracting?), Did CareAuction improve your power position?

## **4 Case Description of CareAuction**

### **4.1 Introduction**

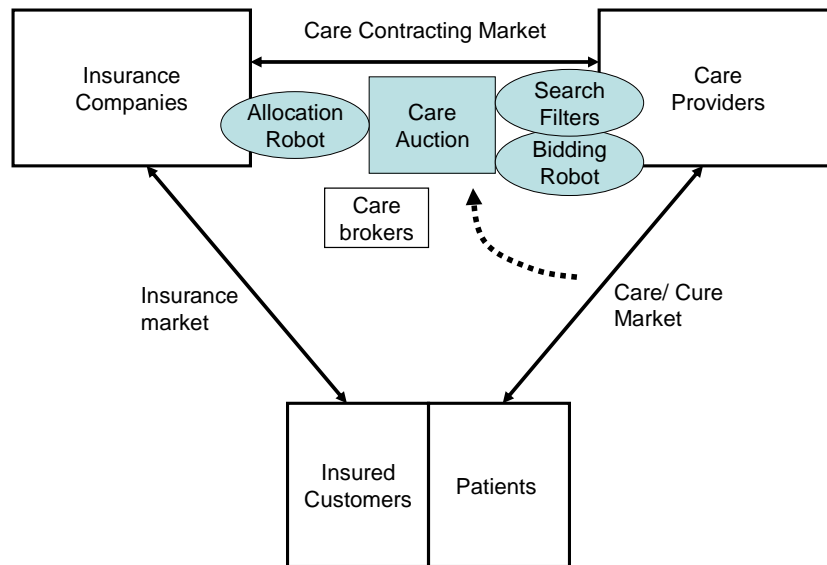
CareAuction is a private initiative and a small (8 fte) privately owned (dotcom) company aiming to enable Internet based auctions for care and care related products and services. The Internet application ([www.zorgveiling.nl](http://www.zorgveiling.nl)) was developed since 2003 and the application is used since March 2005 by two large health insurance companies in the Netherlands (Achmea and Menzis) to purchase maternity care services for their clients (patients). The total number of births is about 200,000 per year in the Netherlands (CBS-Statline) of which Achmea and Menzis contract about 50%. Achmea and Menzis decided not to buy all maternity care through CareAuction, but only the care needed in the peripheries of their business areas, which is a total of about 15,000 births per year. The core areas were still serviced by using bulk contracting per year, meaning a fixed price (per hour) equal to the maximum tariff as determined by the Dutch government.

The essence of the CareAuction procedure is that insured customers (or clients or patients) report their needs for maternity care services to their insurance company, normally 5-6 months before the birth is to be expected. The insurance company enters the need (demand) into the CareAuction web-application, and specifies the amount of maternity care hours in a specific period (immediately after the expected birth date), in a certain postal code area. The care providers that have a contract with the insurance company are contractually bound to make a bid on each request. The auction ends after three or five days and the best bid gets the contract. The best bid is determined as having the lowest price, or the best quality of care, or the care provider preferred by the client (see below for a detailed description of the auction mechanism). Standard maternity care typically consists of 44 hours of home care, divided over five days for a total tariff of 1522 Euro. Each bid by a care provider consists of a reduction of the hourly tariff (34.60 Euro, excluding the additional payment by the patient).

Currently, CareAuction is only used for part of the maternity care volume. CareAuction aims to expand the volume and to extend its intermediary services to other types of care.

Originally, CareAuction was intended to increase the power of patients, helping them to influence care services, to increase customization, competition, and quality of services. In Figure 2, this would mean that CareAuction would be positioned in the care market between care providers and patients. Since this positioning resulted in too many dispersed customers and a high administrative load for the CareAuction organization, CareAuction decided to position itself in the care contracting market between insurance companies and care providers. Actually, in 2006, CareAuction offered a variety of tools (robots) to insurance companies and care providers, facilitating the business to business market.

In this way, CareAuction has deployed IT to change the purchasing processes of insurance companies. Contracts with care providers are no longer made once per year per provider (stating the yearly volumes and prices of care), but contracts are made 200 days per year, individually, now about 15,000 care services per year, varying in price and volume.



**Figure 1:** The position of CareAuction as intermediary in the three health care markets. (the dotted arrow illustrates the repositioning of CareAuction between 2004 and 2006)

## 4.2 The auction mechanism and process

The auction process consists of three stages: the care request stage, the bidding stage, and the care allocation stage. The request stage for maternity care starts when the patient (client) contacts the call center of the insurance company (note that also clients that contact a care provider must be referred to the insurance company). The request is specified and entered into the CareAuction web application. Clients can select one or two preferred care providers, to be chosen out of the providers that are contracted in their region. Clients can also indicate providers that they do not want (negative preferences) (Hoeksema et al, 2006).

The care request is auctioned using the reverse auction mechanism. Before accepting the request, CareAuction checks the completeness. After checking all request of that day, CareAuction releases the request to the Auction at midnight. Care providers must make their bids within five days (Achmea) or three days (Menzis). Care providers have the right to bid on each request, but bidding implies that the provider must deliver care if the bid wins the auction. The start tariff equals the maximum hourly tariff, as determined yearly by the government. The minimum bid is 10 euro (Achmea) or 5 euro (Menzis) on the total number of hours requested. Care providers can use a bidding robot ('autobod') who follows the bidding process and raises a bid in steps of 5 euro (or another step size, determined by the provider) until a maximum bid has been reached (to be determined by the provider). Also, a maximum bid is determined by the insurance company to ensure a minimum quality level.

Care allocation is not done manually by the insurance companies, but by a robot that allocates care to the best bid. The care request is allocated to the bid that was done by the care provider of choice, even if this bid is not the lowest price. In case the client has not listed any provider preferences, then the provider with the highest quality ranking is selected (the quality system is based on client satisfaction ratings, but was not (yet) operational in our test period). If customer preference and quality scores do not result in a match, then the third criterion is used and care is allocated to the best price (the lowest total price). If more providers have bid the same price then a random choice is made.



After the allocation has been made, the insurance company and the winning care provider automatically receive an email listing the terms and details of the agreement. Clients and insurance companies do not pay for CareAuction intermediary services. Care providers pay a fixed fee per contract (19,50 Euro) to CareAuction (bills for these transaction costs are sent automatically by the CareAuction application to the care provider). After the care has been delivered, CareAuction sends an evaluation form to the client, which forms the basis for the quality system.

### **4.3 Portal functionality**

The CareAuction portal offers specific functionalities to two distinct groups. Users enter the home page and have to login as a care provider or as an insurance company. The auction services are for members only. In the test period (2005-2006) the only members were two insurance companies and 155 care providers (being only the care providers that are contracted by the two insurance organizations).

Typical functionalities are (i) the filtering and sorting of care requests, bids, and contracts, (ii) bidding robots, (iii) automatic messaging to alert bidders on new bids by competitors, (iv) news updates and news letters. One insurance company uses the automatic billing functionality; the other company uses manual conversion of data between the CareAuction application and the internal IT systems. No automatic billing facilities or digital interfacing are offered to care providers. Some efforts have been made to improve electronic data interchange but this has stopped because of high costs and lack of standards.

## **5 Analysis of market effects by CareAuction**

The introduction of CareAuction in 2005 has resulted in the emergence of an electronic health care market for maternity care in the Netherlands. An electronic market in the form of an inter-organizational information system (IOS), deployed to connect multiple buyers and sellers, and to support their interactions in order to identify, to select, and to execute transactions (Van Heck and Ribbers, 1998). Also, the IOS is used to exchange information on prices products and the IOS is maintained and developed by an intermediary (Choudhury et al, 1998).

### **5.1 Effects on Market structure**

**Market participants.** Two large insurance companies (their combined market share is about 50% of all maternity care in the Netherlands) and about 160 care providers (out of a total of about 220 in the Netherlands) participate in CareAuction. About 200,000 clients request maternity care per year, with an average of 12,000 to 20,000 requests per month. A care provider can have contracts with multiple insurance companies and an insurance company can contract multiple care providers. Insurance companies can use 'preferred suppliers' to deliver all maternity care to the clients in the core geographical areas of the insurance companies. For care outside this area, insurance companies in the Netherlands can use 'care brokers' (such as LTZ and ZUN for maternity care). Care providers are the organizations that actually deliver (maternity) care. Care brokers are intermediaries in the care contracting market that resell care to insurance companies. Before 2005, 65% of all care requests were allocated to the preferred supplier and 35% were allocated through brokers. With the introduction of CareAuction the care broker activities can be bypassed. In 2005, CareAuction was used for 7% of all requests, to some extent by bypassing the brokers. In 2006, CareAuction did 20% of all requests. Care request in the periphery regions are done by bypassing the brokers.

**Accessibility.** Accessibility of the market has improved after the introduction of CareAuction, because insurance companies can contact more care providers, and care providers can now bid on each request, instead of simply waiting for being allocated to a request by an insurance company or a broker. Although CareAuction has improved accessibility and openness of the care market to some extent (the insurance companies allow more care providers to participate in the electronic biddings than before the introduction of CareAuction), the market remains relatively closed because care providers can only participate after they have been accepted as member of the bidding community by an insurance company.

**Products.** The maternity care market is a homogeneous market with a low product variety. The standard product consists of home care of mother and child and some housekeeping, with some variety in the amount of hours (40) and days (5). Care Auction has not affected product variety but insurance companies and care providers expect some changes in the (near) future to allow for more customized care, also because maternity care might be combined with other home care services.

**Transparency.** CareAuction has increased market transparency for care providers. Before the introduction of CareAuction, each request for care was allocated (and made visible) to only one care provider without providing information about these requests to other care providers. With CareAuction, all providers can see which care requests are made in which region (postal codes) and periods. On the other hand, care providers can only bid on care requests based on information on region and period. Care providers tend to see this as problematic.

## **5.2 Effects on Market Behavior**

**Preferences.** In the early weeks of CareAuction between March and July 2005, 61% to 67% of the care requests included a preferred supplier. In July 2005, this percentage suddenly jumped to 81% to 87% until the end of the test phase (February 2006). This jump is explained by care providers stating that they have instructed their clients to add a preferred supplier to the request to their insurance companies. Apparently, clients have followed this advice.

**Bidding behavior.** Per auction, eight care providers (average number in 2006) participate in the bidding. In July 2005, the average bid (AB) by care providers on CareAuction was 11.7%, meaning that they offered care for a price of 11.7% below the normal (maximum) tariff. The average winning bid (AWB) was 4.3%. The difference is due to clients that indicated a preferred supplier. In January 2006, AB had decreased to 10.2% and AWB had decreased to 2.6%. This strong reduction of AWB was not due to an increase of the indications for preferred suppliers (87% in July 2005 and 82% in January 2006). Apparently, the preferred suppliers made lower bids in January 2006.

**Drivers for using CareAuction.** The insurance companies indicate that they decided to use CareAuction because it provides opportunities for allocating care to preferred suppliers, to achieve better prices, and to introduce a system to assess customer satisfaction. Three out of four care providers do not regard CareAuction to be a success: they see it as a cost factor and an administrative burden and are not satisfied with the auction system. However, the volume of care requested through CareAuction is so high (up to 30% market share) that care providers simply cannot afford to disregard the auction. They are forced to use the auction system because of their contracts with the insurance companies.

**Business processes.** Business processes in the insurance companies and the care providers had to be changed: insurance companies had to adjust the call center process to be able to enter individual requests into the CareAuction web application and to remove the requests after the auctions were finished. Care providers have indicated that they

would like to have more information per request: this would help them to decide on bids. They also prefer that if a care request has a preferred supplier, then the request should be allocated directly to this supplier, without being put on auction. Insurance companies have decided that all requests must be auctioned, including request with preferences.

**Billing system.** Care providers who win the bid on a care request from the Achmea insurance company have to use the online CareAuction billing system as well as their internal billing system. Double data entry means re-keying the contract data, leading to higher transaction costs for these care providers. The other insurance company does not require double data entries, which indicates that higher transaction costs are due to the Achmea decision and not to the CareAuction application.

### **5.3 Effects on Market Performance**

**Price.** Fixed prices do no longer exist: CareAuction has resulted in variable prices per care request. The prices are now 2.6% to 4.3% lower than the maximum tariff, which used to be the standard tariff in the past (see also above).

**Volume.** Obviously, CareAuction has not influenced the total market size, being the number of clients requesting maternity care (clients do not get pregnant because of CareAuction), so the total number of care requests remains unchanged. However, CareAuction has resulted in a significant increase of the number of auctions for maternity care. In April 2005, 800 auctions were done. This number has increased to 1400 auctions per month in August 2005 to January 2006. In May 2006, about 20% of all requests for maternity care were auctioned through CareAuction, and this figure is expected to rise to 30% in 2007.

**Quality.** During the test period, no quality improvement of care has been found. The insurance companies and the care providers expect quality improvement after implementation of the customer satisfaction evaluation system.

**Costs.** The costs of matching care providers to care request have increased due to higher costs of business processes in insurance companies (call center costs), higher processing costs in care providers organizations, and the costs of CareAuction (19 euro per transaction). However, costs of care brokers are avoided.

## **6 Conclusions and Recommendations**

CareAuction is a new intermediary between insurance companies and maternity care providers. The CareAuction instrument was implemented in March 2005 as a reverse auction system in a market for a relatively simple care service (maternity care). The auction mechanism has significantly influenced market structure, market behavior and market performance, in particular in the market between insurance companies (that purchase care services) and care providers (who deliver these services to consumers). Only slight changes were found in the market between consumer and insurance company (consumers preferences are specified in each care request, but consumers do not experience price effects such as lower policy costs). Also, only slight changes occurred in the market between care providers and consumers (care providers suggest consumers to indicate a preferred supplier of maternity care).

In 2006, up to 30% of all maternity care in the Netherlands was allocated on an individual basis, instead of based on yearly contracts. CareAuction has resulted in more competition between care providers, more care providers bidding on care requests, more transparency, increased power positions for the insurance companies to control care transactions, and a slight reduction (2-4%) in the price for maternity care. 80% of the requests for maternity

care are allocated based on preferences (preferred providers). If care would have been allocated based on the best price, then a price reduction of about 11% would be realized.

A quality system (or customer satisfaction system) was not (yet) available in 2006, so that it was not yet possible to allocate care to a care provider based on quality indicators. Insurance companies and care providers prefer quick implementation of this system because they believe that it will result in a more fair allocation of care. They also prefer additional functionalities of the CareAuction application, such as improved management information for providers and insurance companies, and improved linkages of the bidding robots to the internal accounting and business systems (to reduce re-keying and double bookings).

The case shows that the auction principle can be applied to the market for maternity care. CareAuction in its current form has resulted in a stronger market position for the two insurance companies that decided to use it. CareAuction also resulted in more market transparency for insurance companies, but not for care providers or for clients/ patients. Further adjustments to the auction mechanism (for instance by asking the customers to list more than one preferred supplier) might lead to more transparency for all parties, leading to market improvements, including better prices, higher quality, and product differentiation. We advise to investigate the application of the CareAuction principle in other care markets for elective care (not in emergency care) with sufficiently high volumes, sufficient care providers, and sufficient standardization of care services.

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