

# “Towards a Better Patient Care”

*How does the coordination of the use of resources within an out-patient and day treatment department at the National University Hospital work?*

**Unni Kristine Rognlien**



The Master Degree Programme in Health Economics, Policy and Management, Institute of Health Economics and Management, The Medical Faculty.

UNIVERSITETET I OSLO

15.11.2007

## Abstract

A main challenge in the hospital sector is the growing coordination complexity in relation to resource coordination and its impact on the patient logistics. This master project, performed at The National University Hospital, is primarily intended to contribute towards a better patient care. The topic of this project is to explore the present conditions and needs related to resource coordination within some out-patient care services, with the patient in the centre place in the cycle of care. Three key factors have proven to be of importance; the health personnel and the space resources, in addition to the communication exchange. The results of this empirical survey reflect the complexity of coordination. The risk of “time loss” is apparent from the cases examined, and it could put strain upon the patients by unnecessary waiting time. An objective is to make the service delivery transparent and accessible to achieve improvements. By observation and mapping different out-patient care processes, “end-to-end”, this shows that time used directly on patient interaction, the value added time, are less than 50% in almost every out-patient department or unit. From this point of view, the patients appear to lose in the growing coordination complexity of specialization. However, the survey is founded on a method which shows that the lead time can be useful as an overall indicator to assess the coordination in out-patient departments. There is much to be gained by using value adding time as a major indicator of quality as well as efficiency.

**Key words:** Health Care Delivery Value Chain, Supply Chain Management, Lean principles and Patient logistics.

---

## **Preface**

*This project has been a great challenge! However, it has also been a great opportunity to enter an inspiring environment; the surgical out-patient department at The National University Hospital. In relation to my research period, I have met many people who deserve to be mentioned.*

*First I want to thank my supervisor at The University in Oslo; Professor Ole Berg, who has inspired me to carry on - all the way through. His guidance, trust and confidence have been invaluable to me! Further, my thanks go to the Director of Market and Strategy; Stein Vaaler, who gave me the opportunity to carry out this project. The Medical Superintendent of the surgical out-patient department; Dagfinn Albrechtsen and the Head Nurse; Merete Engeseth, are to be acknowledged for their support as well. The staff of health personnel who I have been interacting with during the research period, are just wonderful people! I am very grateful to them, for their positive attitude and professional contribution. In addition, my humble and warm gratitude to all the patients who let me participate during their medical attendance!*

*Some members in my daily life should also be acknowledged; Ole Christian, Hans David, Hans Jørgen and my father Jon, in addition to other close members of my family. All of them can not be mentioned, but I can not resist to mention a few; Jorunn, Ragnar, and Lars Jørgen. The same goes for some of my friends; Eva, Hege and Anjam. Thank you all for your patience, support, for your advice and for putting up with me all the way! At last, I want to mention two persons who in the past have given me treasured memories; my mother Kari and my friend Kristian.*

*To conclude: I hope that you who read this report will gain some new insight. In addition, I want you to remember.....*

***”Discovery consist of seeing what everybody else has seen and thinking what nobody else has thought”.***

(Albert Szent-Gyorgy van Nagyrapol, biologist)

---

# CONTENTS

ABSTRACT .....	2
<i>PREFACE</i> .....	3
CONTENTS .....	4
<b>1. INTRODUCTION</b> .....	<b>6</b>
1.1 THE RECENT DEVELOPMENT WITHIN THE HOSPITAL SECTOR .....	6
1.2 THE TOPIC OF INVESTIGATION.....	11
1.3 THE PLAN OF THE THESIS .....	13
<b>2. LOGISTICAL PROFESSIONALISM AND PERFORMANCE</b> .....	<b>14</b>
2.1 LOGISTICS AND ORGANIZATIONAL COMPETITIVENESS.....	14
2.2 THE VALUE CHAIN MODEL .....	16
2.3 SUPPLY CHAIN MANAGEMENT .....	19
2.4 THE LEAN APPROACH .....	24
2.4.1 <i>The connection between Supply Chain Management and Lean principles.</i> .....	28
2.4.2 <i>Why is the Lean mindset applicable in hospitals?</i> .....	29
2.4.3 <i>Productivity and performance.</i> .....	31
<b>3. METHODS USED</b> .....	<b>36</b>
3.1 RESEARCH DESIGN .....	36
3.2 DESCRIPTION OF THE CASE STUDY.....	40
3.2.1 <i>Explanatory variables and definitions</i> .....	41
<b>4. THE PRESENTATION OF THE DATA</b> .....	<b>43</b>
4.1 THE SURGICAL OUT-PATIENT DEPARTMENT .....	43
4.1.1 <i>Resource Coordination</i> .....	43

---

4.1.2	<i>“The cycle of care”</i> .....	45
4.2	THE PATIENT LOGISTICS: THE DATA .....	46
4.2.1	<i>The orthopaedic out-patient care service</i> .....	46
4.2.2	<i>The urology out-patient care service</i> .....	50
4.2.3	<i>The gastroenterology and oncology out-patient care service</i> .....	55
4.2.4	<i>The Thorax-surgical out-patient department</i> .....	60
4.2.5	<i>The aorta out-patient unit</i> .....	64
4.2.6	<i>The echo out-patient unit</i> .....	67
4.3	“THE WHOLE PICTURE” .....	73
<b>5.</b>	<b>WORKING TOWARDS A BETTER PATIENT CARE</b> .....	<b>77</b>
5.1	REFLECTIONS ON THE FINDINGS.....	77
5.2	CONCLUSION.....	80
<b>6.</b>	<b>TABLE OF AUTHORITIES</b> .....	<b>82</b>
<b>7.</b>	<b>APPENDIXES</b> .....	<b>86</b>

## **1. INTRODUCTION**

A growing economic pressure on the hospital sector in Norway has led to an enhanced attention to how resources are used. Two issues that have been given particular attention are the issues of the coordination of clinical resources and the requirements of efficient consumer response. Ambitious plans for a much more efficient “supply chain management” and “lean thinking” have been put forward in order to “revolutionize” health care provision. Some are even talking about a “quantum leap”. A catchword in this connection has become “industrialization”. The Health East Regional Enterprise (before merging with The Health South Regional Enterprise the 1<sup>st</sup> of June 2007) used this word in their last strategic plan. No matter how “industrialization” is to be understood, it is obvious that it will have a great bearing on the clinical logistics in most of the somatic hospitals in Norway.

### **1.1 The Recent Development within The Hospital Sector**

The Health Enterprise Act (2002) has given rise to an organizational structure where the hospitals have become larger and more complex network-like organizations. This implies a new approach to the value-generative sphere. To tackle the managerial challenges of optimizing the resource allocation and the organizational capability require quicker rates of response, continuous improvements and cost-effective treatment processes. Increasing competition and growing demands for activity and cost control intensify the focus on quality of professional service and care.

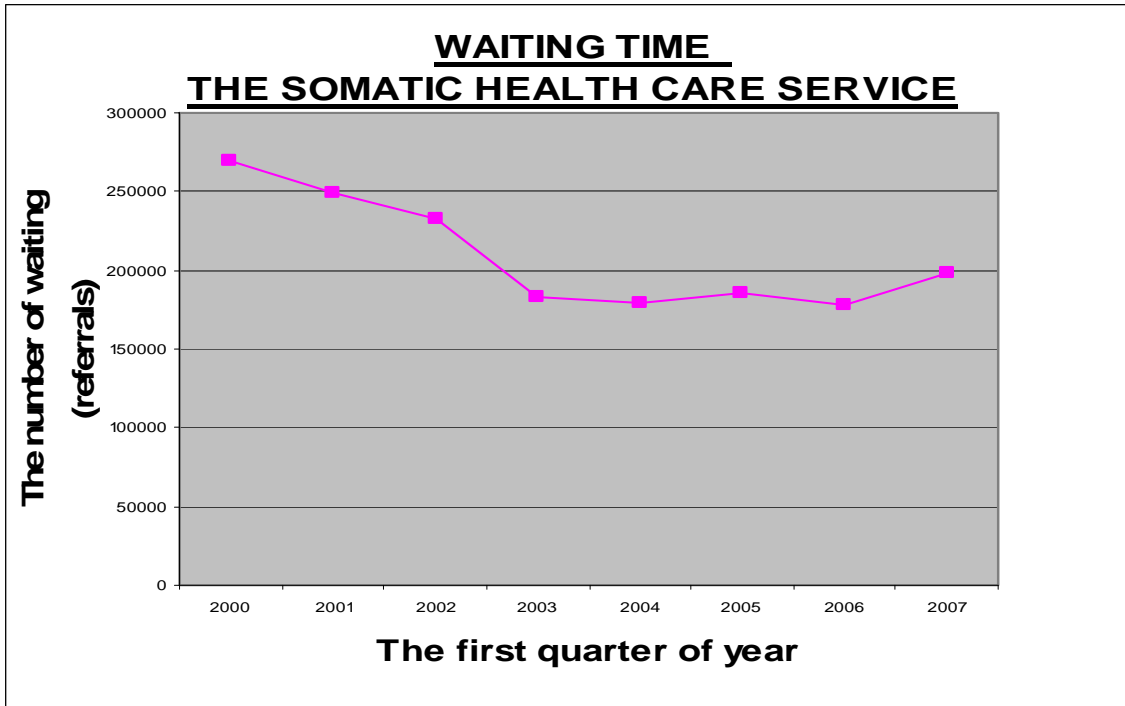
The complexity of somatic hospitals has grown gradually. The trend in Norway is that more and more patients are treated during the daytime. The amount of patient beds filled goes down and the share of out-patients and day patients increases. Further, the medical complexity of the average patient is growing and is likely to continue to grow, since patients become older. Patient expectations are rising and

---

patients are becoming more demanding regarding the access to advanced treatment procedures. Calculations made by SINTEF indicate that the population in Norway will rise by 12.3 % from 2003 to 2025. The elderly part of the population will rise more. (SINTEF Health Research, 2005).

The combination of the development on the supply side, more advanced and more complex services, and on the demand side, an older and sicker population, will subject hospitals to new and more demanding clinical-logistical challenges. Those challenges are related to the coordination of the utilization of the key resources; the personnel, the clinical rooms and the technology. The challenges will be so great that problems are unavoidable. Such problems can also have clinical consequences, in the form of misunderstandings, lower technical quality, reduced caring quality and even errors. Such problems will also affect cost-efficiency in a negative way.

When people become older and develop more and more complex diagnoses, they require extra resources. The pressure caused by the expansion of medical knowledge and technology, imply further development of more complex time consuming treatment processes. When the threshold for treatment is lowered, patient groups can be offered new methods of treatments. Even though the technology implies that patients can be treated faster, waiting lists will probably rise. The most recent numbers of patients on waiting lists recorded by the Norwegian Patient Registry (NPR) show a rise in the number of patients waiting for assessment and treatment (NPR, 2007). To try to increase efficiency in such a situation is difficult. It may even result in decreased efficiency.



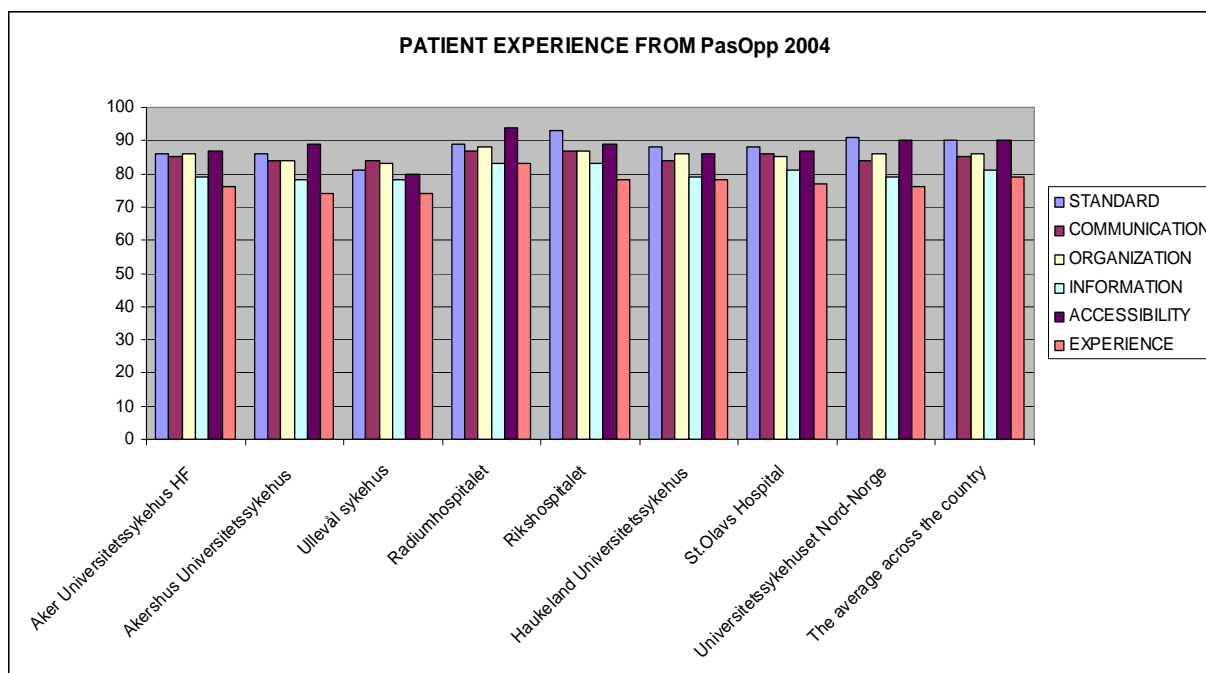
**Figure 1.1: The number of patient referrals in the first quarter of the year 2000 - 2007 in the Somatic Health Care Service (including the private sector). There has been an increase of 19 246 referrals from the first quarter of 2006 to the first quarter of 2007. (NPR, 2007).**

Defective coordination and incomplete information are important causes of the often criticized inefficiency in hospitals. If the patient logistics is not good, it causes unacceptable external and internal waiting times for patients and personnel. The National Centre of Knowledge for the Health Care Services has conducted a national survey of patient experience with somatic out-patient care; The PasOpp 2004. The aim was to measure patient satisfaction on the most important satisfaction indicators. The survey gives health enterprises an opportunity to develop their services by following up the results on six main quality indicators:

- Physical standard (waiting room, toilet, cleaning)
- Communication with the personnel
- Organization (cooperation, information, preparation and coordination)
- Information from the health personnel
- Accessibility (access to the out-patient clinic, “internal access”)
- Experiences before entering the out-patient clinic (waiting time, information and availability on the phone)



The results of the survey indicated small differences between the regional hospitals. The largest differences were found on the indicators accessibility, physical standard and pre-visit experiences. The following statistics shows the results from a selection of hospitals across the country:



**Figure 1.2** : Quality indicator scores from some selected hospitals across Norway, in addition to the average across the country (from all the five health regions in 2004). (Source; [www.sykehusvalg.no](http://www.sykehusvalg.no) ).

The results from PasOpp 2004 need to be compared with the results from studies of other performance variables, such as activity level, efficiency etc. Additionally, lack of information about variation in patient satisfaction between different units or departments restricts the usefulness of the data (PasOpp 2004). For instance, information concerning external waiting time to a particular treatment at a hospital is supposed to be easier to get than information regarding internal waiting time, which could differ among the various departments as well. A Sintef report (2007) has revealed that the waiting time given at the website “Fritt sykehusvalg” diverges

considerably from the observed waiting time in hospitals. Within a large hospital, divisions function as “small hospitals”. Traditional working conditions and routines which may seldom have been changed require more and more resources to gain just a marginal increase in production or quality. Obvious effects of waiting time are economic loss and decline in quality.

What kind of change is desirable? The issue at stake is the added value of treatment versus the resources used, or simply the income versus cost of care. If the hospitals are to be able to meet the expectations of society, it will be necessary to pay attention to the internal operational efficiency. To secure more uniform patient pathways, and equality of access and entrance to care, a mutual underlying understanding of the patient’s journey is essential. Leading hospitals in the United Kingdom (UK), United States (US) and Australia have begun to streamline their delivery paths as a collection of end-to-end patient process flows, looking for more sustainable solutions and better quality outcomes. Process-thinking is supposed to give better quality outcomes for patients, better working conditions for the staff and even lower hospital costs. What these ideas represent is influencing the logistics discussion going on within the Norwegian somatic hospitals too. Some hospitals have ongoing pioneering projects developing process-based delivery pathways which flow more smoothly and efficiently, to save resources and ensure a better outcome.

The National University Hospital, Rikshospitalet–Radiumhospitalet Health Enterprise, is part of the recently established “South-East Health Authority” (1<sup>st</sup> June, 2007). It is a highly specialized hospital, which stresses the importance of “The Patient First”, and has achieved international reputation as a cutting edge hospital. It also acts as a reference hospital in the fields of research and development. The vision of the organization is to represent “Advanced Medicine in a Safe Environment”. Careful planning, commitment and a proactive learning orientation are factors that are to ensure that the hospital preserves its solid public trust. The main objective is to be

---

at the forefront and to create higher value in the future. An on-going project at the national hospital is to secure an efficient and patient-friendly model in out-patient care services.

## 1.2 The Topic of Investigation

Rethinking of intra-organizational relationships, work design and performance within the hospital areas, presupposes convincing research and documentation. Patient logistics is of importance because in the final analysis, it can be a question of life and death. A main task is resource coordination. It is important to see to it that there is a good balance between the requirement of resources and the availability of resources. Thus, my general research question is:

**How is the coordination of the use of resources within an out-patient (and day treatment) department at the National University Hospital working?**

A treatment line is often called “the care delivery value chain.” (Porter, Teisberg, 2006). The care delivery value chain is the basis for the creation of the continuous value stream. Jones and Mitchell (2006) define value stream in this way:

*“A value stream is all the actions (both value-adding and non-value-adding) and associated information required to bring a product (in our case, a patient) through the value-adding process from beginning to end” (Jones, Mitchell, p.18, 2006).*

Thus, through the value stream process, a sequence of steps, tasks, and activities, inputs are converted into outputs and health gains are to be realized (Galloway, 1994). How much value is created depends on how efficiently the resources are used and how qualitatively good, measured both in technical terms and in terms of patient satisfaction, the services provided are. If the available resources are insufficient,

given the demand for the services in question, queues develop. Thus, my general research question can be broken down into a set of more specific questions:

- Seen from a value-generative perspective, how efficiently does the present resource coordination function? How much slack is there? Are there “internal” queues, and if there are, where are they and how long are they?
- What are the sources of the shortcomings? What is the role played by the various physical (space, technology, equipment etc.) and human (personnel, patients) resources?
- What is the quality (technical and patient perceived) of the services provided and what is the relationship between logistical efficiency and quality of the care?
- Given the findings from the empirical study of the workings of the clinical logistics system in some polyclinics at the National Hospital, what can be done to improve it?

A main aim of the study is to make the complexity of health care delivery in the polyclinics in question more transparent. Transparency is a vital foundation for the systematic search for improvements.

I should emphasize that I study out-patient care inside the National Hospital. For patients the treatment line is much longer, and is in fact an integral part of their life story. My findings should to some extent be seen in this light.

Monetary costs are of course vital from a broader efficiency perspective. In this study, however, I will not look at monetary costs.

---

## 1.3 The Plan of The Thesis

In the introductory chapter I present the research questions of the study.

In chapter two I present and discuss the theories that serve as a basis for this thesis.

In chapter three I describe the research design and the empirical methods employed.

In chapter 4 I first describe the out-patient departments I have studied and present my empirical findings and how they can be explained.

In chapter 5 I discuss what can be done to improve the logistical performance of the departments I have studied.

At the end of the thesis I present my references and some appendices

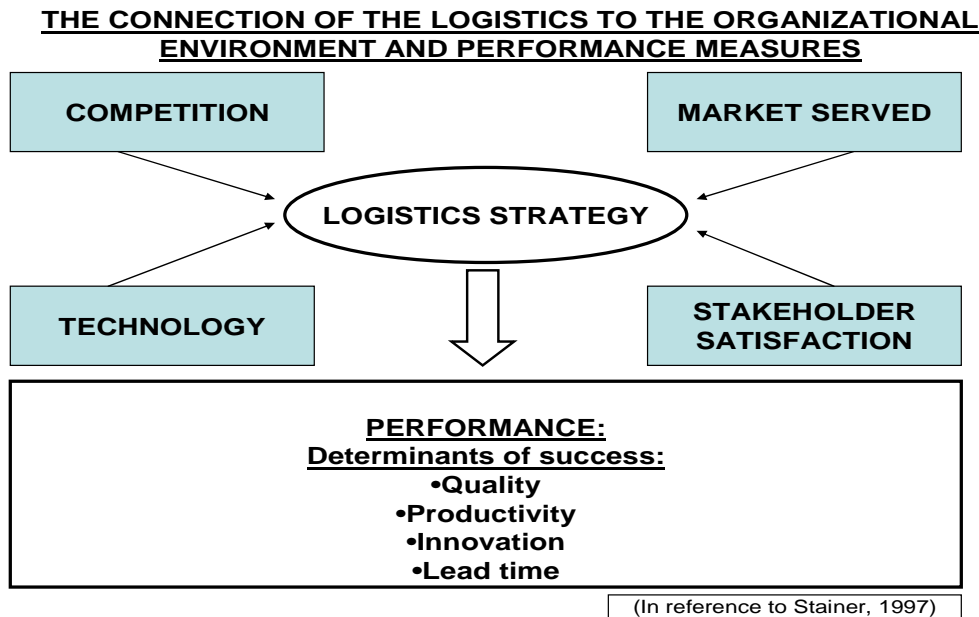
## **2. LOGISTICAL PROFESSIONALISM AND PERFORMANCE**

The service sector comprises a wide range of organizations. However, many underlying characteristics are similar across organizations, one being that customers are very likely to become an essential part of the service delivery process. In this chapter I will describe the theoretical framework of this thesis and why resource coordination has become increasingly important in health care.

### **2.1 Logistics and Organizational Competitiveness**

The theories of organizational competitiveness which I take as my point of departure are theories developed for a market based situation. However, such theories can be fruitful also in a less market-like situation, like that of public health care. Value in health care refers to health outcome “per (Norwegian) krone” expended, or “...as the amount of satisfaction received relative to the price paid for a health care service” (Swayne, Duncan, Ginter, p.153, 2006).

Ways to increase value can be found in the area of logistics. The key factors of logistics are competition, the markets served, technology and stakeholder satisfaction (Stainer, 1997). The following figure is an illustration of how the major factors which are underpinning the strategy of logistical management interact:



**Figure 2.1: Illustration of the connection between logistics strategy, the organizational environment and performance measures. (Cf. Stainer, 1997).**

There is considerable variability of services, even within the same type of organization. However, some commonly accepted characteristics (formulated by Cook et al) are to be taken into consideration (Verma, p. 275, 2001):

- Services are intangible
- The customer is a participant in the service-delivery process
- In a general sense services are produced and consumed simultaneously
- Services have a relatively higher variability in operational inputs and outputs than commodities
- Services generally have time-perishable capacity
- Site selection in services is directed by the location of customers
- Services in general are very labour intensive
- It is difficult to identify appropriate measures of service output

Health care services are organized and coordinated around medical conditions, across specialities and over time. The objective within health care is to increase value for

patients. It can be added that value needs to be measured and understood as the outcomes and costs over the whole cycle of care (Porter, Teisberg, 2006). When competing on value, it can be perceived as a positive-sum competition where all system participants are anticipated to benefit. In relation to this, some principles are accentuated (Porter, Teisberg, 2006):

- Value is to be related to the patient, not just to the costs (or lowering of the costs)
- Value-based competition is based on results, and it is centred on medical conditions over the full cycle of care
- High quality care is perceived to be less costly
- Focused attention on provider experience, scale, and learning at the medical condition level, drive the value
- The competition should be local, regional and national.
- Information about results must be available
- Innovations which increase value must be strongly rewarded

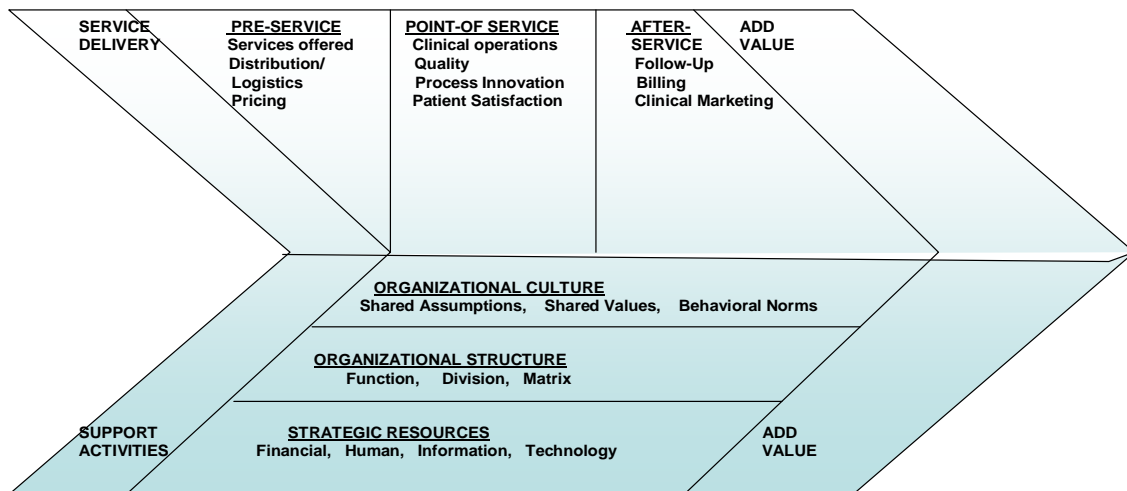
Value-based competition within health care delivery requires a sustained, critical attention to the processes of care delivery at the medical condition level. The value chain model, Supply Chain Management and Lean methods offer a framework for such an attention.

## 2.2 The Value Chain Model

Porter's value chain model (1985, 2006) is a strategic tool which contributes to determine the setting of the dynamics within the working environment and the efforts of value creation. The value chain is based on the assumptions that delivery of any product or service consists of performing numerous discrete activities, activities that are configured and integrated in such a way that they drive values (Porter, Teisberg, 2006). Organizational culture, structure and strategic resources are sub-systems which support the service provision.



## THE VALUE CHAIN



Source: Adapted from M. E. Porter, *Competitive Advantage: Creating and Sustaining Superior Performance*, 1985

**Figure 2.2:** A simplified model of M. E. Porter's value chain (1985).

The value-generative systems are superior to the sub-systems, whose function is to aid, ensure and simplify the service provision itself. Organizational culture comprises shared assumptions, values and behavioural norms. Organizational structure deals with the formal configuration of the organization as the organizational matrix of divisions and departments. Strategic resources comprise financial instruments, the human capital and the infrastructure. These three sub-systems are fundamental in relation to the value creation within the service provision.

The patient is the primary objective and in the centre of the value-generative health care provision. The new value chain concept or model “The Care Delivery Value Chain” (CDVC), put forward by Porter and Teisberg (2006), emphasizes the effects of quality in the health care service delivery:

*Good quality is less costly because of more accurate diagnoses, fewer treatment errors, lower complication rates, faster recovery, less invasive treatment, and the minimization of the need for treatment.*

(Porter, Teisberg, p.7, 2006)

To truly understand the creation of value, it is necessary to address the medical condition where the value actually is created. Simplified descriptions of elements which have impact on the value-generative health care provision are (Porter, Teisberg, 2006):

- The set and sequence of activities in the care delivery
- The mix of professional skill and the structure of teams
- Coordination across the activities and seamless handing-over procedures
- A structure of care which ensure the linkages across different parts of the service delivery. (“A linkage occurs when the way one activity is performed affects the outcome or cost of others”) (Porter, Teisberg, p. 210, 2006)
- The collection, integration and utilization of information in care delivery
- The utilization of facilities and locations
- Work specification for the providers who are responsible and accountable for the (formal) coordination and hand-over procedures (health personnel, teams or departments)
- Specification of scope of services and accountability for results

The tasks involved in the CDVC, are categorised as value added actions, non-value added but necessary actions or non-value added but not necessary actions, of which the latter refer to “waste”, which also can be comprehended as synonymous with “slack”. “Waste” is activity that only reduces quality and increases the operating costs. The so-called e-activities lower costs and increase earnings per patient treated and k-activities do the opposite (Hagen, Kjekshus, 2003). However, it is important to keep in mind that some activities, often called k-activities, are non-value adding yet necessary from a value-generating perspective. Examples are research, education and human resource development (Hagen et al 2001, 1996). I will here, though, mainly

---

differentiate between value-adding actions and non-value-adding actions, because “The assumption underlying the value chain is that each activity either adds or removes value from the products or services at hand” (Brewer, p. 129, 2001).

In brevity, “fast, flexible flow” of service delivery and care is the beneficial state of the value generative cycle of health care activities. “Waste” or “slack” within health care provision reduces quality and increases the cost. When eliminating “waste” in the delivery value chain, patient satisfaction should rise, and so should the competitiveness of the provider in question. The management of coordination is highly dependent on cooperation, functional integration, information sharing and feedback across the care delivery activities

## 2.3 Supply Chain Management

Logistics consists of links between the customers and the operating organization. Logistical management is the means whereby the needs of customers are satisfied through the coordination of resources and information flows (Christopher, 1998). Customer service is a powerful contributor to competitive advantage. Service-driven logistical systems and their supporting co-ordination processes are aimed at ensuring that customer service goals are met (Christopher, 1998).

The goal of logistical management, says Christopher, “is to maximize customer service whilst simultaneously minimizing costs and reducing assets locked up in the logistics pipeline” (Christopher, p. 217, 1998). According to this flow-oriented perspective on logistics, if one is to improve performance in the “service pipeline”,

one must understand the structure of the process and be able to identify the critical points in it; that is, the points where things could go wrong (Christopher, 1998).

The concept of supply chain management (SCM) was originally introduced in the early 1980s and is regarded as one of the most significant paradigm shifts of modern business management (Lambert, 2001). SCM represents a radical widening of the concept of logistics, so that it encompasses the integration and management of all key business processes across the entire supply chain (Lambert, 2001). Thus, the Global Supply Chain Forum define supply chain management as

*...the integration of key business processes from end user through original suppliers that provides products, services, and information that add value for customers and other stakeholders. (Lambert, p.100, 2001)*

Thus understood SCM becomes a holistic concept, taking as its point of departure the “ultimate customer”. The objective of SCM is to create the most value for the whole supply chain network, including the end customer (Lambert, 2001). It has a strategic “win-win” perspective. It implies to try to be profitable both for “the ultimate user” (the customer) and the firm (or enterprise).

Lambert is considered to have one of the most well developed frameworks for the understanding of supply chain management (Persson, Grønland, 2002, Lambert, 2001). This framework can be said to have a close connection with the care delivery value chain framework. In his framework Lambert emphasizes three interrelated elements:

- the supply chain network structure,
- the supply chain business processes, and
- the managerial components (supply chain components).

---

To understand the supply chain network structure one must first identify who the members of the network are. They can, according to Lambert (2001), be

- primary members and
- supporting members.

Then one must grasp how they interact, that is what

- the complexity of the network is.
- The structural dimensions of the network are:
  - the horizontal structure (the length of the supply chain), which refers to the number of tiers across the supply chain,
  - the vertical structure (the width of the supply chain), which refers to the number of suppliers or customers represented within each tier and
  - the company's horizontal position within the supply chain, which is somewhere between the initial source and the ultimate customer.
- To fully understand the network structure one must also identify the different types of process links across the supply chain, both upstream and downstream.

The supply chain business processes are the activities which determine the output of value to customers. The “point of consumption” is where no further value is added and the service (or product) is consumed (Lambert, 2001). The structure of the process determines how the working operations are carried out. How the allocation of resources among the different process links across the supply chain is, is crucial to the success of the process. The levels of integration will vary from link to link and over time. Some links are more critical than others (Lambert, 2001).

The third element, the managerial components, is crucial to how each process is managed and coordinated across all the supply functions (Lambert, 2001). The managerial components constitute “the backbone” of the planning and steering of the

supply chain, and shall secure that the work performance is in accordance with the operational goals of the process.

Christopher's definition of supply chain management seems to be in accordance with Lambert's framework for the understanding of supply chain management. His definition of supply chain management is (Christopher, p. 18, 1998):

*The management of upstream and downstream relationships with suppliers and customers to deliver superior customer value at less cost to the supply chain as a whole.*

To improve the logistics and management of supply chains Christopher argues that it is essential that the participants demonstrate a high degree of (Christopher, 1998, Stainer, 1997)

- **Responsiveness**
- **Reliability**
- **Relational quality.**

Christopher emphasizes that customers in all markets are increasingly time-sensitive; "The cost of time is simply the additional costs that a customer must bear whilst waiting for delivery or whilst seeking out alternatives" (Christopher, p. 149, 1998). A crucial competitive variable is lead time, which is the elapsed time from order to delivery (Christopher, 1998). A "lead-time gap" appears when the time to procure, and deliver a finished product or service to a customer is longer than the time the customer is prepared to wait for it (Christopher, 1998). This is based on the assumption of the Japanese "Just-in-time" philosophy of logistics. This philosophy is stressing that no activity should take place until there is a need for it, and all elements of a supply chain needs to be synchronized. A main barrier to flexibility is "set up time", which refers to time spent on changes in volume, product or service variation.

---

A flattening organizational structure leads to the creation of a sharpened horizontal integration of functions. Nowadays integration is supposed to be “logistical,” that is process-based, rather than “vertical” and management-based (Christopher, 1998). This means that organizations increasingly are organized around processes rather than tasks, built upon multi-functional teams and a market driven logistics strategy. Thus, the key to horizontal organization is that the focus is on processes rather than functions. However, an extension of horizontal integration, both internal and external, could imply that the complexity of logistics increases.

According to SCM, prior to any implementation of logistical change, both vertical and horizontal structures of the organization need to be reviewed. Lambert (2001) says that logistical change can be seen as a “re-engineering process.” Such a process can be said to consist of three stages:

- The fact finding stage, which is the stage where a detailed examination of the current systems, procedures and workflows (separating facts from opinions) is carried out.
- The business redesign stage, where areas for improvement are identified (customer contact points and information transfer points).
- The creative improvements stage, where processes and information flows are redesigned.

To sum up: In supply chain management the focus is on total costs and total performance. The vertical organization is to be inwardly oriented, with attention directed toward the utilization of the resources, rather than to the “production” of outputs. However, it is the horizontal linkages which mirror the flows of resources and information connected to the customer. Outputs can only be achieved by co-ordination and co-operation horizontally across the organization” (Christopher, p. 260, 1998). This is crucial for the understanding of how logistics processes can be improved.

The so-called Lean approach is of great relevance to supply chain thinking. I turn to this approach now.

## 2.4 The LEAN approach

The care delivery value chain embraces the whole cycle of care as a lifelong commitment. Lean thinking has, as SCM, a holistic approach with focus on the entire supply chain. The philosophy was developed for the Toyota industry and was derived from pioneering practices within the Toyota Production Systems (TPS). It is aimed at observing the best practice organizations, with the core principle of putting “the customer first”. Lean research emphasizes prevention of waste by holding up “the three R-s: Reduce, Reuse, and Recycle (Bicheno, 2004).

The underlying logic is the “end-to-end” value stream. To delineate sets and sequences of activities, this will yield important insight. Every step and link within a treatment process is critical with respect to optimal patient flow, in addition to communication exchange and feed-back loops. Galloway (1994) defines a value-added step as a step that contributes to customer satisfaction, where the customer would notice if it were eliminated. It is the creation of a balanced flow which is the key (Bicheno, 2004).

An objective in lean is to create “Fast, Flexible Flow” (Bicheno, 2004). “Fast” refers to the speed of operation and reflects the importance of time. The economies of time is claimed to be the best single overall measure. To achieve high speed implies that resources must be sufficiently adjusted to each other. “Flexible” refers to the patient segment, flexible labour and adaptive lay-outs, aimed at low variation standards in time and quantity. “Flow” refers to a seamless movement through different value-creating steps by steadily adding value and bringing any waste to the surface



---

(McManus, Millard, 2002). A so-called “pull type system” leads to flow without delay, to satisfy the customers needs (Jones, Mitchell, 2006) (McManus, Millard, 2002). To synchronise the information exchange, the physical flows and the working operations so that they meet “just-in time”, ensures a more streamlined process tailored to the patients. The implication of “fast, flexible flow” is to avoid complexity and achieve simplicity, even by breaking down barriers between traditional departments (Bicheno, 2004). Construction companies adopting lean have reported an unexpected phenomenon that small wins tend to beget anew ones, like propagation through snowballing, creating opportunities for more and often larger improvements (Vrijhoef, Koskela and Howell, 2001).

Waste prevention or elimination is the principle means in lean. Activities that create no value, but are necessary to maintain operations, are called “type 1 Muda” (waste is mentioned as “Muda” in the American vocabulary). Activities which create no value or simply destroy value are named “type 2 Muda”. Whilst type 1 Muda is perceived to be the easiest one to access, it is probably the most difficult one to remove. Waste (or Muda) in relation to logistics, can be grouped into the following types (Ahlstrom, Pynch, 2006, Bicheno, 2004):

1. **Overproduction or duplication:** “Overproduction is making too much, too early or “just-in-case”” (“just to be safe”) (Bicheno, p.15, 2004).  
Overproduction is perceived to be one of the most serious ones of all the wastes, and leads directly to excessive lead time (the time used from start to finish).
2. **Transportation or unnecessary transfers:** A satisfactory coordination of the various steps within a process is of importance to avoid non-value adding steps.

3. **Waiting time or delays:** One indicator of ineffective coordination is waiting-time. Waiting is conceived to be among the most important wastes, because it has a direct impact on lead time and patient satisfaction. The ultimate goal is to achieve smooth flow within the process.
4. **Excessive amount of inventory or work:** Inventory is conceived to have inverse impact on quality and communication. It tends to increase the lead time, increases space and could have a detrimental effect on communication exchange.
5. **Excessive effort or motion:** This type of waste comprises the ergonomics, the human capital and the availability of (skilled) personnel (not too few or too many).
6. **Defects and errors:** Occurrences of procedural errors or performance errors (medical or technical errors) have detrimental effects.
7. **Unclear communication:** A sufficient clarification of instructions and responsibilities is essential.
8. **Opportunity lost:** Reliability and behavioral norms have effect on patient satisfaction.

Further, the infrastructure, including an appropriate communication network system could be added. In practice the different types of waste are usually woven together and affect each other.

Waste prevention or elimination is related to the six S activities; “Sort, Simplify, Sweep, Standardize, Sustain and Safety”. “Sort” refers to throwing out what is not used. “Simplify” refers to locating what is used in the best place, and that everything is in its place. “Sweep” refers to quality in performance and responsibility. “Standardize” comprises work time, work sequence, and standard work-in-process. “Sustain” is about self-discipline, participation and improvement. The sixth S, “Safety”, refers to safety procedures and standards. (Bicheno, 2004).

---

The characteristics of lean can be summarized by Womack and Jones's five principles (Bicheno, 2004):

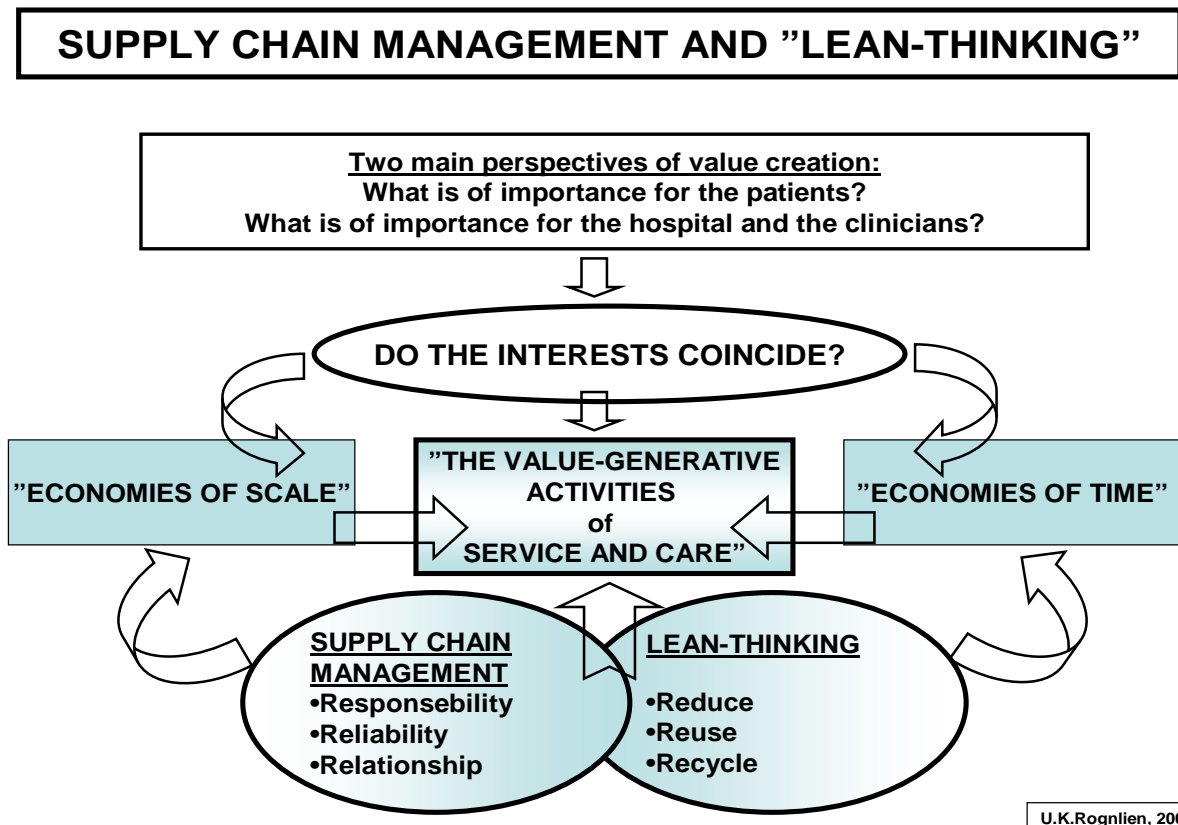
- The starting point is to specify value and needs from the “customer’s” or the “patient’s” point of view. “Anything that helps treat the patient is value-adding. Everything else is waste” (Jones, Mitchell, p.16. 2006).
- Identify the value stream by the viewpoint of the “customer” and the economics of time.
- To make value “flow” means never delaying a value adding step by a non-value-adding one.
- Pull based demand means delivering health care services within a short-term response and within an appropriate time frame in accordance with patient needs and satisfaction.
- Perfection means quality and “zero waste”; that is, producing exactly what is needed, when it is needed, with minimum cost.

The lean logic emphasizes the patient and the process itself, and the collaborative effort of the participants. It is the knowledge of the working-staff which is the power in lean, and a presumption is that the review of routines and procedures has to be locally conducted and rooted in the organizational strategy. A bottom-up perspective on how the work is to be done is essential to gain improvements. An assumption is that when processes are simplified, resources can be saved and utilized alternatively, and the capacity can be improved without significant extra spending.

### **2.4.1 The connection between Supply Chain Management and Lean principles.**

Resource coordination has become increasingly important in health care, and all the perspectives outlined are focusing on logistical improvements. Supply chain management is closely connected with business management (industrial firms and manufacturing), and has a market-driven and profit oriented perspective. The logic of industrialization comprises elements like specialization, standardization, efficiency and competition. It involves a development of more or less shielded treatment lines, which require a sufficient patient volume to achieve economies of scale. However, this does not always demand large treatment units.

The lean approach has a demand-driven and value oriented perspective (as the CDVC). Standard works referring to lean are not associated with industrial “mass production”. Instead lean thinking emphasizes the development of “the best practices”. Thus it also emphasizes the importance of flexibility. Flexibility is important if one is to make controlled changes in the short term. Coordination of simultaneous, parallel and overlapping working operations is aimed at reducing the overall time. The following figure gives an illustration of the connection between SCM and lean:



**Figure 2.3:** An illustration of the connection between Supply Chain Management and LEAN-thinking.

Even though there exists fully developed delivery value chains for several medical conditions, the need to access, delineate and analyze them more explicitly is a continuous task. The important question is how applicable the perspectives are to needs of the health care sector.

#### 2.4.2 Why is the Lean mindset applicable in hospitals?

There are endless numbers of long and often linear patient processes that makes lean suitable and adaptable in hospitals. The traditional perspective of “how to do things” is forced to give way for the new thoughts of industrialization and process organization. There are significant challenges that need to be addressed (cf. section 1.1). The NHS Confederation Leading Report (Jones, Mitchell, 2006) describes how lean can be applied to the hospital sector to improve “the patient’s journey”. The

Lean Enterprise Academy in the UK has set up a Lean Healthcare Network to help clinicians and board members by encouraging the development of new insights and new ways of problem-solving. Lean is perceived to be applicable and useful so that short-term “fire-fighting” becomes a thing of the past (Jones, Mitchell, 2006).

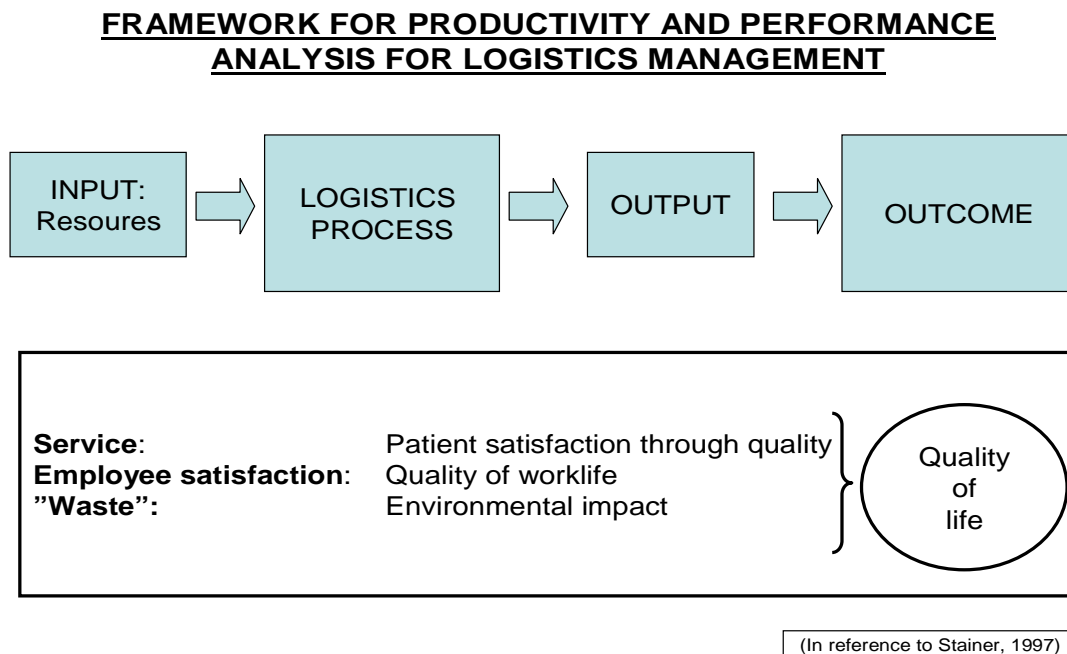
Norwegian hospitals are non-profit organizations; the patients mainly pay for the services via taxation. The patients’ preferences are therefore more explicitly connected to the quality of service delivered. Confer the following documents and principles:

- The law of patient rights, especially as regards equality, accessibility and entrance to care.
- The statutory principle of free choice of health care provider.
- Patients are becoming more and more able to get information about their conditions using modern communication technology (the Internet).
- Culture change makes patients more inclined to approach clinicians as “colleagues”.
- A “patient journey” nowadays often consists of an extended network of clinicians.

Publicly the trustworthiness of the health care providers is likely to decline if the supply of services is not satisfactory. Waiting time may appear if demand exceeds the treatment capacity, if the activity is held artificially lower than required, and if there is scarcity of resources or logistical imbalances. Waiting patients could suffer both mental and physical stress (or could even die). Waiting time is time which could have been spent in a number of other, more rewarding, ways.

### 2.4.3 Productivity and performance

Christopher says that organizations compete through logistics (cf. section 2.3). The lean perspective emphasizes that organizations do not only compete on productivity, but on value and patient satisfaction (ref. The Lean approach, section 2.4). The challenge is to grasp the logic of the logistics, because the output may not always be obvious. The framework for logistical analysis from input to outcome, can be illustrated in this way (cf. Stainer, 1997):



**Figure 2.4: Framework for analysis of logistics management.**

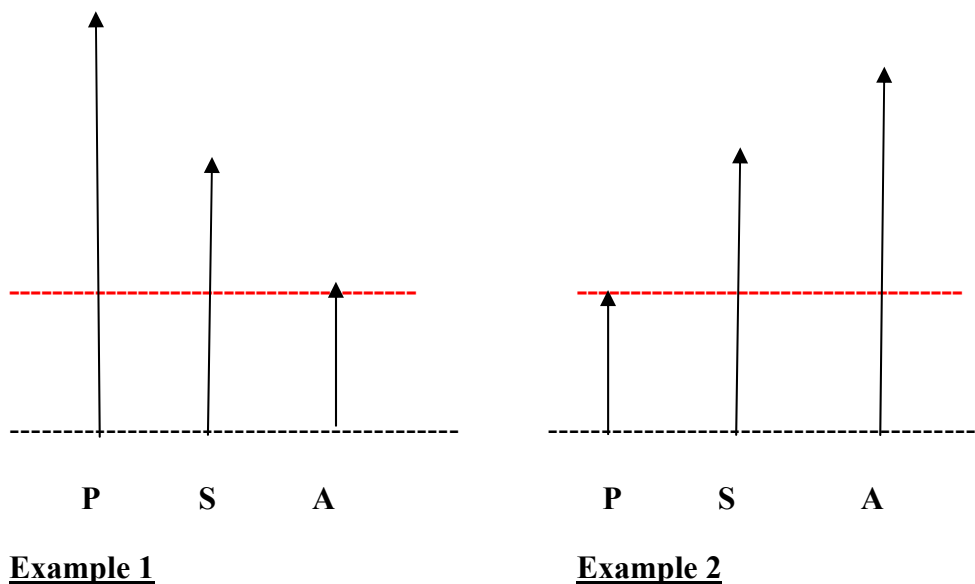
The coordination of resources is essential when creating an optimal and a “tailor-made” patient logistics. To be “tailor-made” refers to the “flow” of the operational work (not the health personnel). The resource utilization and the outcome of logistics can be interpreted as a function in time, and central components could be expressed through this formula:

$$C = f(A, P, S, t, F, I, \varepsilon)$$

The meanings of the symbols are:

- C = Capacity
- A = The resource area, facilities and materials
- P = Labour input and competence
- S = Supporting services and medical technology
- t = Time
- I = Infrastructure
- F = Financing or capital input
- $\varepsilon$  = A stochastic element including factors such as emergency tasks, teaching and research.

The following simplified examples show how well adapted to each other the various resource factors can be:



**Figure 2.5: Two examples of resource adaptation.**



---

The key symbols express:

-----→ Limit of capacity

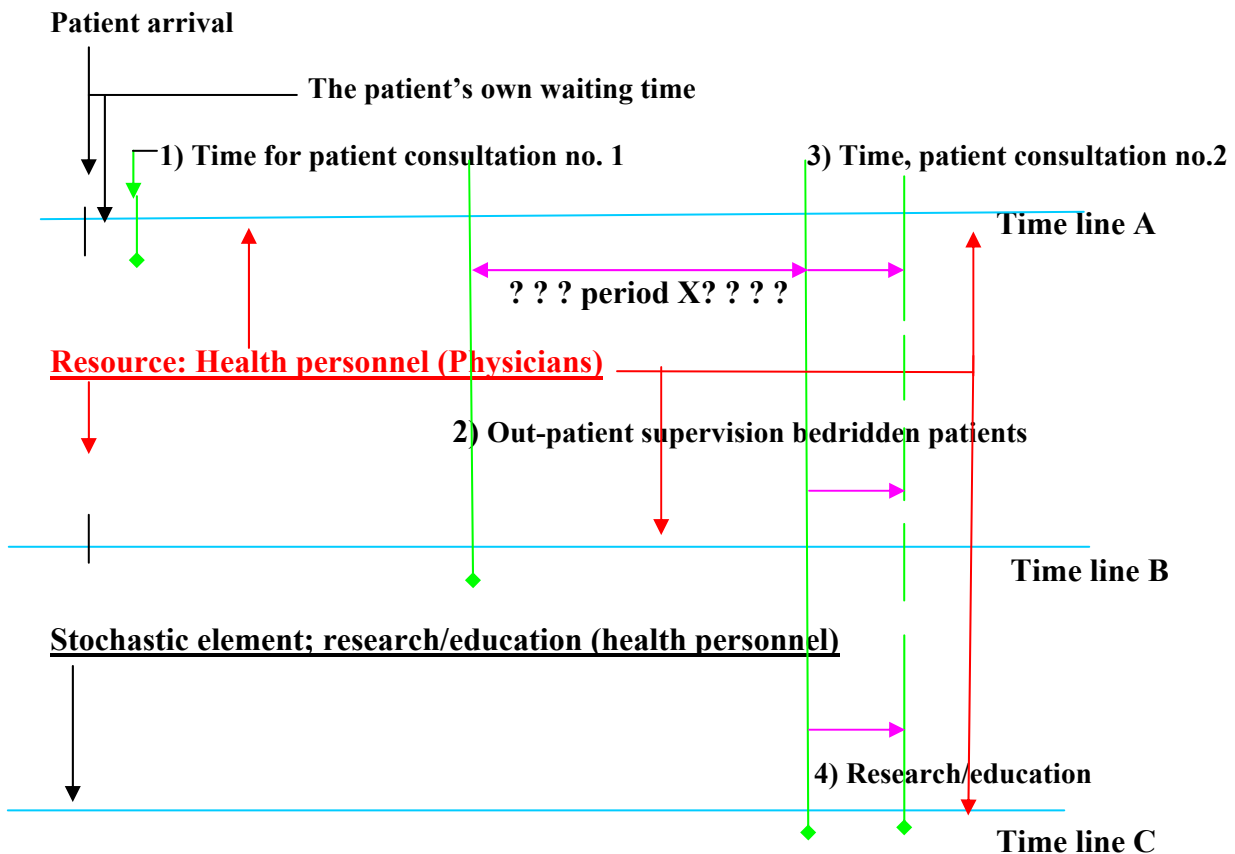
P -> Labor input and competence

S -> Supporting services

A -> The resource area, facilities and materials

Examples 1 and 2 represent different contexts. However, both examples indicate that the resource components are not adjusted adequately to each other (ref. the capacity line). The “poorest” factor defines the capacity limit. An imbalance in the resource components leads to waiting time or “slack”. In example 1, the resource area, facilities and materials are the scarcity factors, and the excess capacity of labor and supporting services lead to waste (or slack). In example 2, (specialized) health personnel are the scarcity factor.

An aim in relation to patient logistics is that the variance of each process step is low. A managerial challenge is to find “the optimal distribution formula” to create an optimal “flow”. “Friction”, created by e.g. emergency tasks, will lead to time loss. “Friction” can be perceived as the active, flow-opposing force. If the friction becomes high enough it might bring the process to a complete stop. The following figure illustrates the process coordination complexity:



**Figure 2.6: Resource coordination and utilization within an out-patient care department: an illustration.**

The figure shows how the resource area, facilities and materials are utilized (time line A) and how the health personnel is utilized (time line B). Finally the figure illustrates the role of a stochastic element (time line C). The activities performed are patient consultations (activity 1 and 3), supervision of bedridden patients in the hospital (activity 2) and research/education (activity 4). The time lines of the activities (1-4) are shared time, and the activities take place within the same time frame. Scarcity of specialists in period X occurs because of the supervision of bedridden patients. The capacity is restricted by the weakest resource component. It should be added that the coordination becomes even more complex when additional supporting services are taken into consideration.

---

Clearly, every single step or link within a treatment process is critical to an optimal patient flow. Research has revealed that much effort is often not value-adding to patients, and care delivery processes have not been systematically analyzed (Porter, Teisberg, 2006). Three basic steps can be taken to explore the value creation within the health care service delivery in relation to resource coordination and its impact on patient logistics (Jones, Mitchell, 2006):

- Identify value streams
- Map the value streams
- Identify and implement improvements.

### 3. METHODS USED

This chapter reviews the methodological background of the research work.

#### 3.1 Research design

The survey is an empirical study of some patient categories and treatment lines within the surgical out-patient department at The National University Hospital. The research question is:

“How does the coordination of the use of resources within an out-patient and day treatment department at the National Hospital work?”

The survey is mainly quantitative, but with some qualitative characteristics. The tools used to explore the topic are:

- Interviews
- SWOT-analyses
- Value stream process mapping
- Questioning staff involved by use of a questionnaire

The point of departure for a more thorough study was a set of SWOT-analyses. A SWOT analysis is a type of analysis often used in connection with strategy development of organizations that are exposed to competition (Løwendahl, Wenstøp, 2003). SWOT is an abbreviation for Strengths, Weakness, Opportunities and Threats. The two former refer to intra-organizational factors, while the two latter refer to inter-organizational circumstances. The SWOT-analyses were performed by means of interviews based on an interview guide. The interviewees could freely choose the

---

sequencing of the general questions asked. The out-patient and day-treatment department selected for SWOT-analysis were:

- The Infantile (children's) department,
- The Medical department,
- The Dermatology department,
- The Rheumatology department,
- The Neurology department,
- The Surgical department,
- The Ear-Nose-Throat department (changed to Ear-Plastic-Orthopedic)
- The out-patient department at Montebello.

The general results, looking at all the departments collectively, is summarized in the following table:

<b>SWOT ANALYSIS</b>	<b>SUMMARY OF MAIN CHARACTERISTICS FROM THE EIGHT OUT-PATIENT/DAY-TREATMENT DEPARTMENTS</b>
<b>STRENGTHS</b>	<p>Focus on flexibility; interdisciplinary cooperation and job rotation.</p> <p>Focus on alternative resource coordination of health personnel within the department.</p> <p>Awareness of the patients` needs and professional reliability.</p> <p>Awareness of patient service and quality standards regarding external and internal waiting time.</p>
<b>WEAKNESSES</b>	<p>The resource area was often experienced as a scarcity factor.</p> <p>The administrative computer system was perceived as having capacity constraints.</p> <p>There were challenges associated with the network communication flow between key personnel and supporting services.</p> <p>There were challenges associated with continuity in relation to the resource coordination.</p> <p>There was a request for management tools at the clinical level regarding resource coordination and activity.</p> <p>There were no common routines or countermeasures regarding no-show patients.</p> <p>There were no common routines for mapping requirements regarding temporary employment, sickness absence, retirement, recruitment etc.</p>
<b>POSSIBILITIES</b>	<p>Expansion of capacity by extended opening hours and/or extended nursing activity.</p> <p>Competitiveness in relation to quality improvement of service and care.</p> <p>Research and cooperation with external specialists.</p> <p>A progressive resource coordination of specialities within and between hospitals.</p> <p>A common (and user-friendly) network system within the out-patient/day treatment departments with sufficient capacity to meet the expected demand in the future.</p>
<b>THREATS</b>	<p>Increasingly complex logistical situation and rising demand for out-patient care and day treatment services.</p> <p>Scarcity regarding resource area and number of specialists.</p> <p>Worries about the availability of economic resources in the future.</p>

---

The SWOT-analysis showed that the logistical resource coordination poses a challenge to the hospital. It also indicates that the resource area and key health personnel are important resource components if the clinics are to achieve an optimal patient flow. Collaboration and interaction regarding information exchange between core activities and supporting services are of importance. Even though the SWOT analysis shows that there are some systemic problems in the clinics, it is important to bear in mind that strengths and weaknesses (opportunities and threats) may be situational too.

To assess the results of the SWOT-analysis, process mapping has been carried out. The tool chosen is Jones and Womack's "Learning to See" map, which is a value stream mapping often used to illustrate the current state of a process. It is a qualitative method, describing how to operate in order to create flow and it is suitable for repetitive operations. Value stream mapping describes what is actually possible to do in order to affect quantitative measures (Shook, Rother, 1999). The method consists of standardized icons or symbols ("push"-arrows, process-boxes and data-boxes in which to insert important information). A timeline at the bottom of the map is corresponding with the stages within the process, and it gives an indication of the value-adding time and the non-value adding time (waste). The mapping includes;

- to map the "length" and "width" of the treatment line (the patient's movement throughout the treatment process):
  - the basic and essential step (within the core activity)
  - the parallel processes (the supporting services)
- registration of requirements and adaptation of resources:
  - health personnel (specialization)
  - resource area and facilities
  - medical procedures and, if possible, the time of performance

- registration of delays and waiting (the explanatory variables can be found in section 3.2.1)
- observation of the information flow vital to the coordination
- to observe and gather information in general

Further, a flow diagram of the resource coordination has been constructed. As a supplement, a qualitative questionnaire addressed to the health personnel contributes with additional information (Appendix 1 p. 87; the questionnaire is in Norwegian). The experienced health personnel are well suited to evaluate the work performance. This is of importance when considering what to give priority to when it comes to the development of improvements.

The reason for using these methods to explore the topic is that they provide insight and knowledge about the conditions that could adversely affect the patient logistics. By combining quantitative and qualitative methods, it provides a view to “see and learn the best way” to create value for patients.

## 3.2 Description of the case study

The research has been carried out by following 151 consultations, “from end to end”. Each of them has been mapped separately (one map for each patient), with exception of a small number of patients within the oncology and echo out-patient care services. The latter have been recorded by data from the administrative computer system (PIMS). During the research period, it was only possible to follow one medical specialty at a time. The filling out of the questionnaire was based on oral information as regarding the purpose of the study, and occasionally it was performed as interviews with some of staff members.



---

The study has been carried out in accordance with ethical norms and objectivity criteria. We cannot, however, exclude the possibility of bias in connection with the collection and processing of the data. My presence at the consultations could influence both the health personnel and the patients. However, an “anthropological presence” also gives an excellent opportunity to learn how things really happen

Doubting my opinion, observation has been a necessity for the satisfactory completion of this project. Observation gives a wider perspective than do the “cold numbers”. Observation gives contextual a more contextualized understanding of what happens. I must add that the cooperation with the staff was very good.

### 3.2.1 Explanatory variables and definitions

Types of outcome measures used in this review are (Shook, Rother, 1999):

- **Working time (W/T)**: The working time per patient.
- **Patient transfers (P/T)**: The number of “patient touch” or contact points. (How the patient moves within the service process).
- **Changeover time (C/O)**: The time necessary to switch from one out-patient consultation to another. This involves e.g. different kinds of administrative work.
- **Value added time (V/A)**: The time used directly with patients (the core consultation).
- **Cycle time (C/T)**: The time passed between one patient’s “exit” and the next patient’s “entry” (minutes); that is, the time it takes for the health personnel to go through all of their work elements before repeating them. The formula used is:  $V/A + \text{Interruptions during the core consultation} + C/O = \underline{C/T}$

- **Lead time (L/T)**: The time it takes to move the patient through the whole process (“end to end”). If the patient does not wait or if the consultation has been started earlier than scheduled, this has been recorded as 0 time (zero wait). The formula used is:  $C/T + \text{The patient's waiting time prior to the core consultation (with exception of the patient's own waiting time)} = \underline{L/T}$
- **”Waste”**: The changeover time (C/O), in addition to the time passed on delays and waiting. The formula used is:  $L/T - V/A = \underline{\text{Waste}}$ . It can be added that:  $C/O + \text{Waiting time} + \text{Interruptions} = \underline{\text{Waste}}$ .

The dependent variable is the Lead time (cf. chapter 2). The time is measured in minutes. Patients who did not show up are excluded from the calculations to avoid error. The core consultation has been counted as one “patient touch.” However, the arrival at the counter of the surgical department is not. The assisting nurse, connected to the different out-patient services, has several routines to perform. These include tasks such as making preparations, checking attendance, replacing medical materials and tidying up at the end of the day. I have not recorded such activities separately. Usually one will find that  $V/A < C/T < L/T$ .

---

## 4. THE PRESENTATION OF THE DATA

In this chapter I am presenting and discussing the results of the study of the supply chains in the various clinics. First I look at the surgical out-patient department.

### 4.1 The Surgical out-patient department

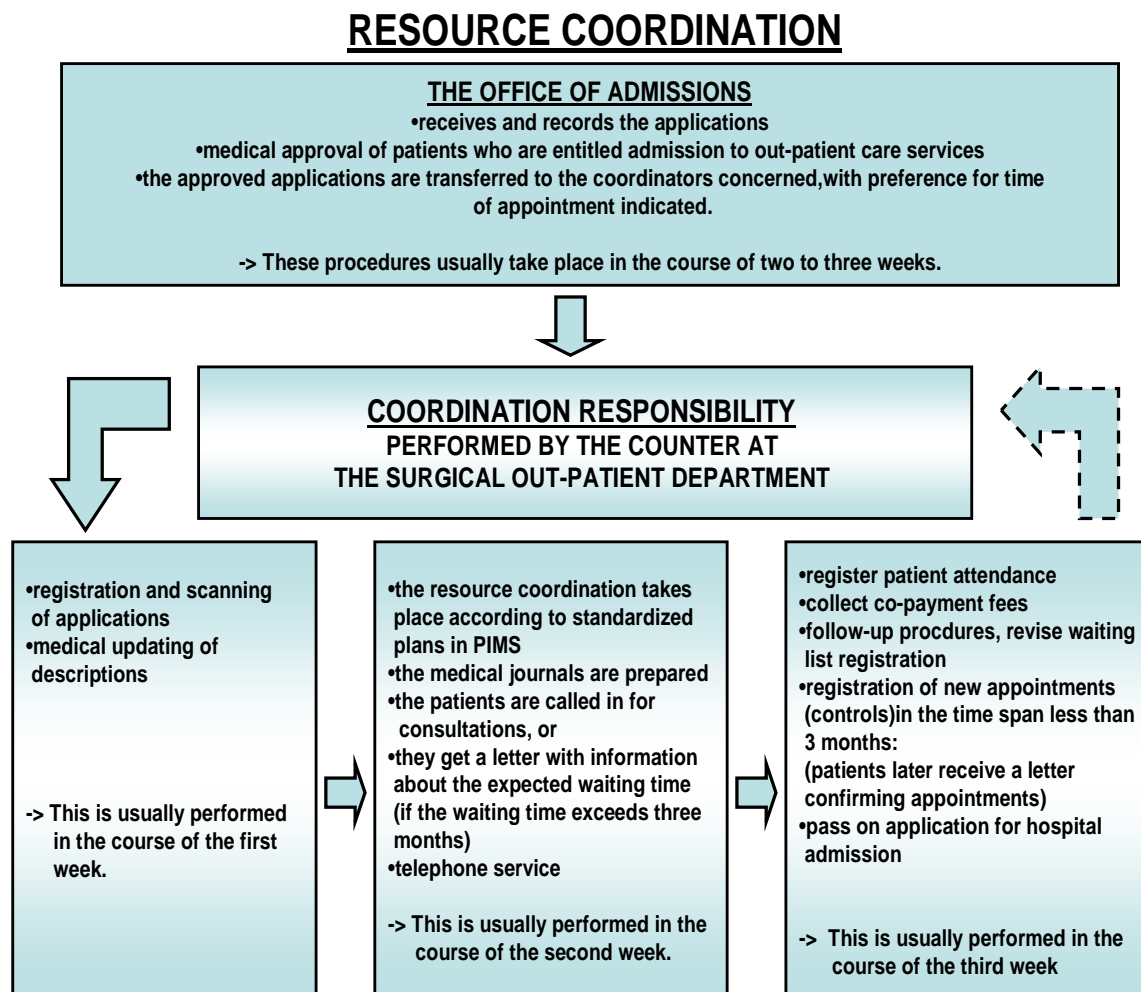
The amount of out-patient consultations which are provided in the surgical out-patient department in the course of a year is approximately 25 000 (Årsrapport, 2006). The department has nineteen rooms for patient consultations, and has 23 400 square meters in total at its disposal. There are 4–5 waiting areas for the patients within the department. They are located close to the consultation rooms. The area is distributed among various out-patient care services. The department has a nursing staff who usually serves the specialties attached to the department. Each department which performs out-patient care services within the surgical out-patient department is responsible for its own activities, and how they are organized and coordinated and how the (specialized) medical equipment is used. The specialty units within the surgical out-patient department which are included in this study are:

- The orthopaedic out-patient unit
- The urology out-patient unit
- The gastroenterology out-patient unit, including the oncology out-patient subunit
- The thorax-surgical out-patient unit; including the thorax-heart out-patient subunit, the aorta out-patient subunit and the echo out-patient subunit.

#### 4.1.1 Resource Coordination

A process consists of activities which often are structured cross-functionally. The various patient categories can be coordinated by different patient coordinators. In

”my” case, the counter at the surgical out-patient department also coordinates the patient consultations of the gastroenterology out-patient unit and the urology out-patient unit. The coordination of the orthopaedic out-patient care and the thorax-surgical out-patient care is the responsibility of the respective departments. The following overview shows how the coordination works, from the referrals have been received to the consultations have been performed (Cf. interview with Beate Bremnes, Coordinator at the surgical out-patient department, 2007):



**Figure 4.1: An overview of the coordination which shows the resource coordination performed the counter at the surgical out-patient department.**

by

However, the coordination is not necessarily done the same way at other out-patient departments as it is done by the surgical out-patient department. There is no common standard for how the coordination is to be done. The counter at the surgical out-

---

patient department performs the resource coordination in accordance with a standardized plan for the use of personnel and resource area and uses the administrative system PIMS as a booking system. The PIMS system gives a good “visual” impression of the use of the resources, but becomes less flexible when the number of specialities involved increases (more than three) (Cf. scenario analysis performed by Berit Dahlstrøm, Senior Executive Officer at the IT-department, The National University Hospital, 2007). My SWOT analysis showed that the out-patient departments often used additional procedures to coordinate and to achieve the necessary overview of the resource utilization.

#### **4.1.2 “The cycle of care”**

The Gender Identity Disorder group (G.I.D patient group) provides an example of how complex the clinical process (ref. Porter, Teisberg, section 2.2) in the surgical out-patient department can be. For patients with this kind of disorder the care involves multiple visits to the clinic, extending over a period of ten years. An overview of this process can be found in appendix 2 (p. 88). Here it suffices to mention that the treatment of these patients requires the cooperation of eleven types of medical specialists. Annually approximately 800 patients are treated. 30 consultations are conducted each week for these patients. (Årsrapport, 2006 and an interview with Liv Helgaker, specialized nurse, National University Hospital, 2007).

It has not been possible to integrate this group in the survey because of the time frame of this project. The next section is devoted to the out-patient care services defined introductorily (cf. section 4.1).

## 4.2 The Patient Logistics: The Data

My survey includes 151 patient consultations. I have directly observed 135 of these patients. The data collection about 16 of the patients has been done from the electronic patient administration system, PIMS. Eleven patients were absent or cancelled consultations, and five patients were recorded as emergency or extra consultations. 27 health care providers (13 specialists, 13 nurses and 1 technician) filled out the questionnaire I gave them. Some gave additional oral comments.

### 4.2.1 The orthopaedic out-patient care service

The orthopaedic out-patient unit has a capacity agreement with the surgical out-patient department which specifies an activity level of fifty-nine patients per day (Årsrapport, 2006). These patients are administered by the ear-plastic-orthopaedic department. The department has its counter in the same reception as the surgical out-patient department. The orthopaedic out-patient unit had 8934 consultations in 2005 and 9231 in 2006 (Årsrapport, 2006).

My data collection took place in the course of three days. It comprised data from 43 patient consultations. Three patients did not show up and one represented an emergency. The standard consultation time is 20 minutes per patient in the morning, and 30 minutes in the afternoon (after lunch). The patient flow in this unit is out-lined in a flow diagram; see appendix 3 (p. 89). See also appendix 4 for an overview of the explanatory variables (p. 90). In the next paragraphs, I will present some information about the patient flow in the orthopedic unit during my observation period.

15 of 43 patients were “first-time” appointments, 27 were recorded as “control” appointments, and one was an emergency case. There were four instances of double-

---

booking. Three kinds of health personnel were engaged in the service delivery; an orthopaedist, a nurse and a gypsum technician. The nurse was usually present at the core consultations. The technician was called in when his or her assistance was needed.

During the consultations, additional medical assessment was requested for 3 of the patients. The orthopaedist was occupied 47 minutes with external medical assessments, and 43 minutes were used answering phone calls (and the beeper). There were 8-10 requests at the door (related to coordination and medical assessments). Passage of health personnel in and out of the room (the nurse/technician who performed other parallel services attached to the patient consultations) and instances where medical descriptions were lacking, affected the workflow. Instances which influenced the workflow, both during and between the core consultations, took 94 minutes (including the patients waiting time; 32 minutes).

The parallel process of independent medical procedures, performed by the nurse and/or the technician, took 117 minutes. The procedures could be performed before or after the radiology service, or were sometimes integrated into the core consultation. Such procedures were required for 8 patients, and lasted for approximately 2 to 20 minutes (the procedures included tasks like taking out sutures, or removing or adapting a cast). These procedures could in some situations reduce the patient's waiting time between the core service and the supporting service, and in this way it had a positive effect on the value adding time.

Delays were in some situations caused by later start-up time than scheduled (50 minutes). However, some of the patients were delayed too (39 minutes in total). The available time prior to consultations (80 minutes) was due to instances of using less time than scheduled, delayed patients or patients who did not show up. This time was

mainly used on medical assessments (internal or external medical assessments). 15 of the patients arrived before the scheduled time, and this accounted for 183 minutes in total.

Radiological service was required for 16 patients (266 minutes). The scheduled waiting time between the radiology service and the orthopaedic consultation, was 928 minutes. However, the influence of parallel procedures performed by the nurse/technician and earlier start of consultations for some of the patients, made the real waiting time between the services add up to 894 minutes (average: 55,9 minutes, and median: 43 minutes). The occupational therapy service and/or physical therapy service were required for 7 patients. These services were usually provided after the core consultation. Time data about these services have not been included in this survey. It has not been possible to record requirements for hotel accommodation.

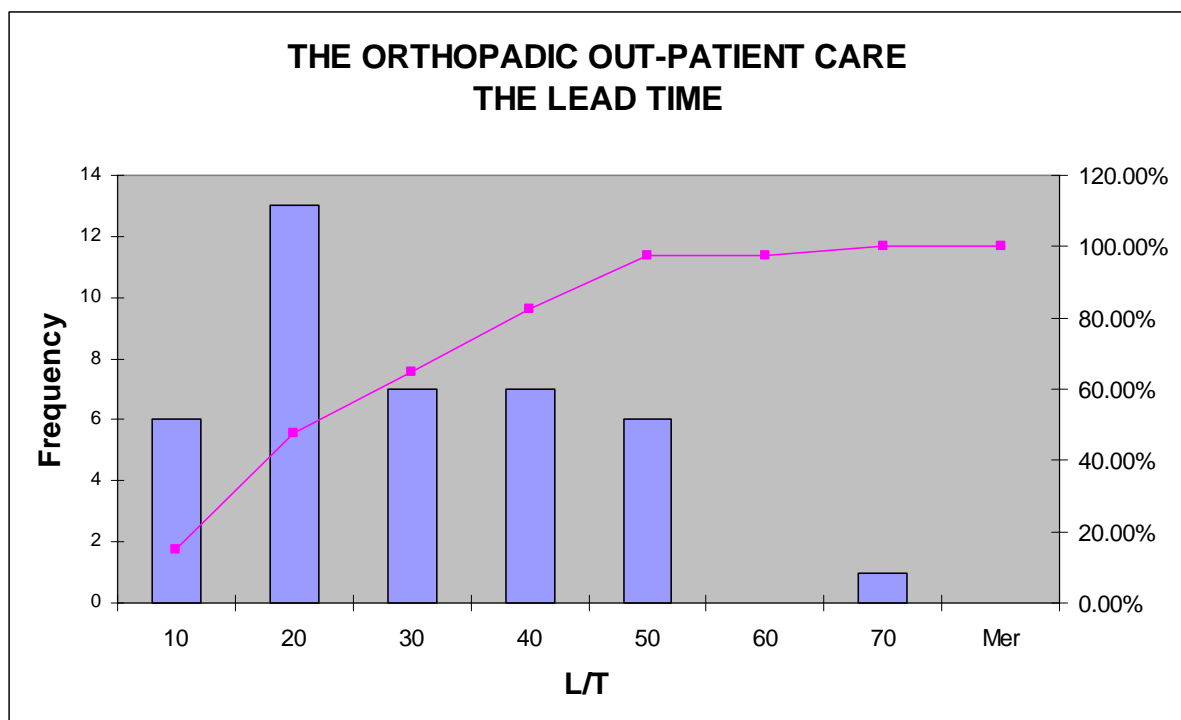
Consultation rooms and facilities were mainly technically independent of each other, though they are all connected through the electronic communication network. However, the medical procedures (like plastering) were partly dependent on the facilities. There can be additional supporting services involved that I have not observed during my registration (for instance the additional technician who adjusts equipment and the social worker).

Questionnaire data shows that there are restrictions related to the resource area and the facilities. Interruptions during the consultations, directly or by beeper or phone calls, sometimes cause delays. Patients can be delayed either because of cross-functionally coordinated supporting services or just because of something the patients themselves do or do not do. Waiting lists would have decreased if the radiology capacity, especially for CT-examinations (computer tomography), had been increased. The fixed working time (W/T) and the occurrences of double-booking,



give rise to additional stress on the health care providers. It is obvious that the patient logistics can be improved.

The lead time gives us an understanding of how the coordination works. The time span of the consultations ranges from 6 to 63 minutes (40 of 43 patient consultations: Patients who did not show up are excluded from the calculations). The average lead time is 24.9 minutes and the median lead time 21 minutes. The lead time variance is 186.9 and the standard deviation (how the measurements are spread around the average lead time) is 13.67. The following bar chart shows the relation between the number of patients and L/T:



**Diagram 4.2: The relationship between frequency (the number of patients) and lead time (minutes)<sup>1</sup>**

Approximately 65% of the patient consultations fall within the interval 11 to 38 minutes. The cumulative graph is in this interval steeper. There is a positive

<sup>1</sup> Each pillar in the bar chart indicates a lead time interval, and each dot on the cumulative graph indicates the percentage frequency of the lead time gathered at each point and downwards (the L/T frequency).

skewness in the data (the median is lower than the average). The fixed working time (W/T) is 20 to 30 minutes, which corresponds with the L/T average and L/T median. The ratio between waiting time and changeover time (C/O) is 1.63. (The sum of these times is equal to waste, cf. 3.2.1.) The proportion of “waste” in relation to L/T is 45.2%. The proportion of V/A (value-adding time for the patients) in relation to L/T is then 54.8%.

To sum up: The factors which influenced the patient logistics negatively were delayed start-up time (specialists), double-booking of patients, delayed patients (or no show-ups), medical assessments and instances of interruptions. In addition, restrictions related to the working area in connection with the conduct of parallel procedures, influenced the patient logistics negatively.

#### **4.2.2 The urology out-patient care service**

The coordination of the urological out-patient unit is coordinated by the counter at the surgical out-patient department. Consultations by specialists were 1319 consultations in 2005 and 1335 consultations in 2006 (Styringsdata R-R HF, 2007). A urological therapist operates at a uro-dynamic laboratory (Monday to Friday). The demand of this function has increased from 398 consultations in 2005 to 428 consultations in 2006 (Styringsdata R-R HF, 2007). Another therapist (“stomiterapeut”) is available for consultations four days a week, and this activity has increased as well, from 275 consultations in 2005 to 327 consultations in 2006 (Styringsdata R-R HF, 2007).

The data collection took place in the course of two and a half days, and includes data from 31 consultations. The registrations have been accomplished by observations from the “outside” of the core consultations. The standard consultation time is 30

---

minutes per patient. The flow diagram of the resource coordination can be found in appendix 5 (p. 91), and the explanatory variables in appendix 6 (p. 92).

5 of the thirty-one patients were “first-time” appointments, 24 were recorded as “control” appointments, and 2 were emergency patients. There were 4 instances where patients did not show up, 1 consultation was cancelled, and there were 3 instances of double-booked patients. 2 patients, who arrived early, came in before scheduled time (61 minutes in total). The health personnel involved were a urologist, a skilled nurse assisting the urologist, a urological therapist, an additional therapist (“uroterapeut”) and a skilled nurse serving the specialists at the surgical ward (D3 1053). The surgical ward was shared between the urologists, and it was utilized to perform specialized procedures (as cystoscopy). The urological therapist performed independent medical procedures, as well as assisting the urologists. The assisting nurse worked outside the core consultations, and performed a few independent medical procedures. The additional therapist (“stomiterapeut”) is not included in this survey.

The parallel process of independent medical procedures performed by the assisting nurse is measured to 66 minutes. It was required for 7 patients, and lasted between 3 and 19 minutes (mainly measurement of residual urine and “flow”, and ultrasound of the urinary bladder). These procedures were performed in separate wards (D3 1064 and D3 1066). The assisting nurse used approximately 30-50 minutes to prepare for the day, and approximately 45 – 60 minutes to clearing (cleaning and sterilizing medical equipment) at the end of the day.

The urological therapist has a separate patient schedule and performs a number of independent procedures, which in similar laboratories in other departments are performed by specialists (usually with ancillary personnel). This was a parallel

service, which could be performed before or after, or sometimes as part of, the core urological consultation. 4 patients required this service. In the assessment of the recorded data, I have made allowance for these services which represent 79 minutes of the value added time. However, the urological therapist was absent one day, which influences the assessment of this function.

In connection with 4 instances, an additional specialist and/or assisting nurse were brought in to assist (142 minutes). The main reason was “time-crack” compared to standard time because some patients needed more time than scheduled. Delayed starts were measured to 45 minutes (specialists). Also some patients were delayed (11 minutes in total). Available time prior to consultations (112 minutes) was mainly caused by events of no show-ups (5 patients). Interruptions have not been measured while the registration has been done from the “outside”.

Radiological service was required for 4 patients and usually performed some days before the consultation. Biomedical laboratory service was required for 2 patients. Hotel service was required for 3 patients; however, the routine for ordering this service is manual and difficult to trace.

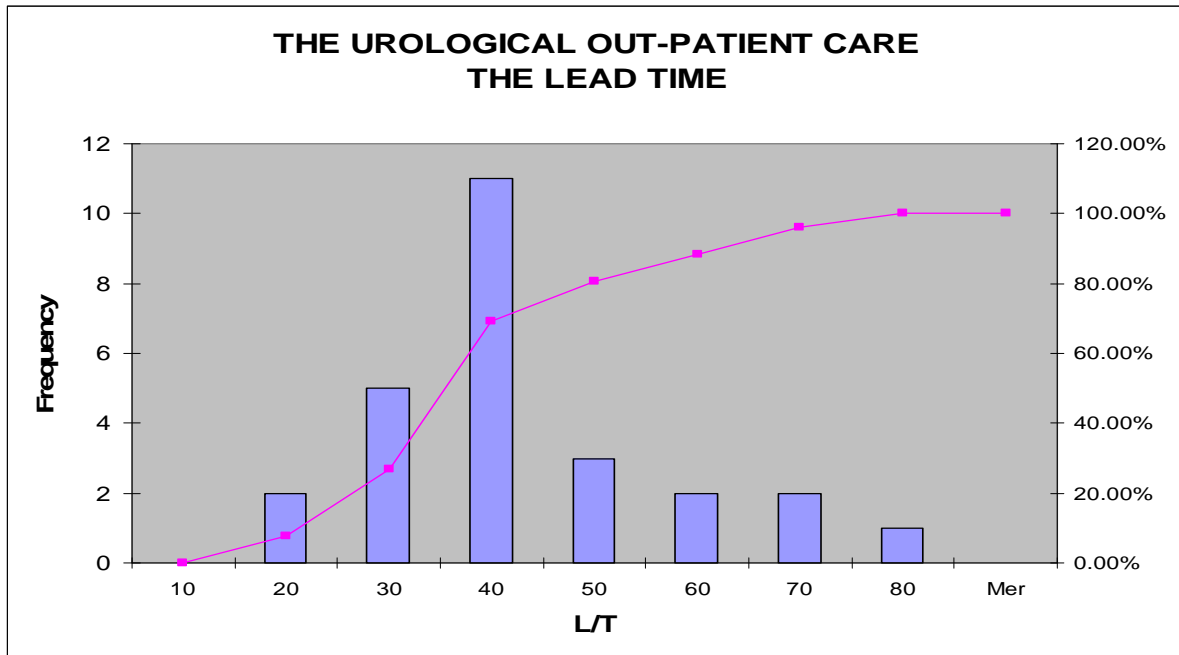
The consultation rooms used for the core urological consultations were technically independent, except for the communication network. The rooms used for medical procedures were mainly dependent on the facilities. However, the surgical ward lacked connection to the computer network system, which made it excluded from information exchange with the ancillary systems. Scarcity of technical equipment in relation to cystoscopy (with a flexible cystoscope) made it necessary to borrow such equipment from the surgical department each day it was needed. The availability of equipment in general was restricted too, because the specialists shared one medical equipment trolley which could be needed in two places simultaneously. The localization of the different operational rooms was spread, which sometimes resulted

---

in additional patient transfers within the department. Scarcity of space resources was apparent when two different out-patient care services were coordinated cross-functionally and used the same consultation room. In another situation, the surgical ward was occupied because it was used for other surgery.

The questionnaire data show that there is a challenge related to the space resource. The operational working area is perceived to be too scattered. The time from budgetary approval and purchase to the delivery of medical equipment (as a flexible cystoscope) is often long. To have the necessary equipment available, in the right place and to the right time, is a requirement that is not always met. Double-booking of patients and the fixed consultation time are also factors that can affect the workflow negatively. However, interruptions during the core consultations are not perceived to be a major problem (as beeper and phone calls). The main challenge is perceived to be the total capacity, and more feed-back in relation to organization and coordination of the service is desired.

The span of the consultations is 16 minutes to 73 minutes (26 of 31 patient consultations). The average lead time is 39.65 minutes and the median is 36.5 minutes. The variance is 219, and the standard deviation is 14.8. The following bar chart shows the relation between the number of patient consultations and L/T:



**Diagram 4.3: The relationship between the frequency (the number of patients) and lead time (minutes)<sup>2</sup>**

Approximately 65% of the patient consultations are in the interval of 25 minutes to 54 minutes. The fixed working time (W/T) is 30 minutes, and this is less than the L/T average and the L/T median. The ratio between waiting time and C/O is 1.87, which shows that the waiting time counts for nearly twice as much the C/O. The proportion of “waste” in relation to L/T is 56.8%. The proportion of V/A in relation to L/T is 43.2%.

To sum up: Delayed starts (specialists), double-booking of patients, delayed patients or no show ups, prolonged consultations, in addition to restrictions related to medical equipment and the location of rooms, were among the main factors which influenced the patient logistics negatively.

<sup>2</sup>Each pillar in the bar chart indicates a lead time interval, and each dot on the cumulative graph indicates the percentage frequency of the lead time gathered at each point and downwards (the L/T frequency).

---

### 4.2.3 The gastroenterology and oncology out-patient care service

The gastroenterology and oncology out-patient units are coordinated by the counter at the surgical out-patient department. In 2005, the number of gastrological out-patient consultations were 447, in 2006 it was 522 (Årsrapport, 2006).

The data collection took place in the course of two days, and includes 20 patient consultations. Unfortunately, it has not been possible to do a complete registration of the 8 consultations within the oncology out-patient unit. Data from this out-patient unit are collected from the administrative computer system (PIMS). The fixed consultation time is 30 minutes in the gastroenterology out-patient unit, and 45 minutes in the oncology out-patient unit. An overview of the resource coordination is visualized in the flow diagram found in appendix 7 (p. 93), and the explanatory variables can be found in appendix 8 (p. 94). The registration has been done from the “inside,” with the approval of the patients and the specialists.

3 of the 20 patients were “first-time” appointments, 17 were recorded as “control” appointments, and one patient did not show up. The health personnel involved were a gastroenterologist and an assisting nurse, who in addition served an oncologist. The assisting nurse worked “outside” the consultations, from an adjoining examination room. The location of this room was placed with some distance from the consultation room where the oncologist worked. The nurse did not perform any independent medical procedures, but assisted the gastroenterologist (and the oncologist) when asked. It was performed one gastroenterological examination in the adjoining examination room (11 minutes).

During the time of registration, there were 2 instances of double-booked patients, an emergency call (1 minute) and an additional medical assessment (5 minutes). One

patient was received earlier than scheduled, and this counted for 9 minutes. Incomplete communication had led to a misunderstanding where the gastroenterologist was set up both for the night-shift and with responsibility for the out-patient consultations (and emergency tasks) the next day. During the night-shift the gastroenterologist had participated in transplant operations. During the day watch the gastroenterologist was required for an emergency task at the operating theatre, which lasted for 65 minutes. This resulted in missed lunch break and a delay of 35 minutes. Later the computer network broke down, and was down for the rest of the day.

In addition to the network error and the emergency case at the operating theatre, delayed start-up time (75 minutes) and prolonged consultations affected the logistics negatively. The freed up time, due to quick shifts between consultations, was amounted to 28 minutes. Interruptions during the consultations were mainly caused by beeper or phone calls, and consultations with other specialists (14 minutes).

Radiological services were required for 18 patients and were usually performed some weeks or days in front of the consultations. When both x-ray and CT (computer tomography) were required, it was usually performed at the same day (only one exception). Examination at the gastroenterological laboratory was required for 2 of the patients, but it has not been possible to find out when these services were provided. Biomedical laboratory service was required for 1 patient. It has not been possible to record patient stays at the hotel, since the ordering of this service is done manually (by fax).

The consultation rooms were mainly independent on medical facilities, except from the communication network. However, the communication network seemed to be a problematic factor. When the network collapsed, the specialists were excluded from information exchange with the radiology network system (PACS). It took time to get



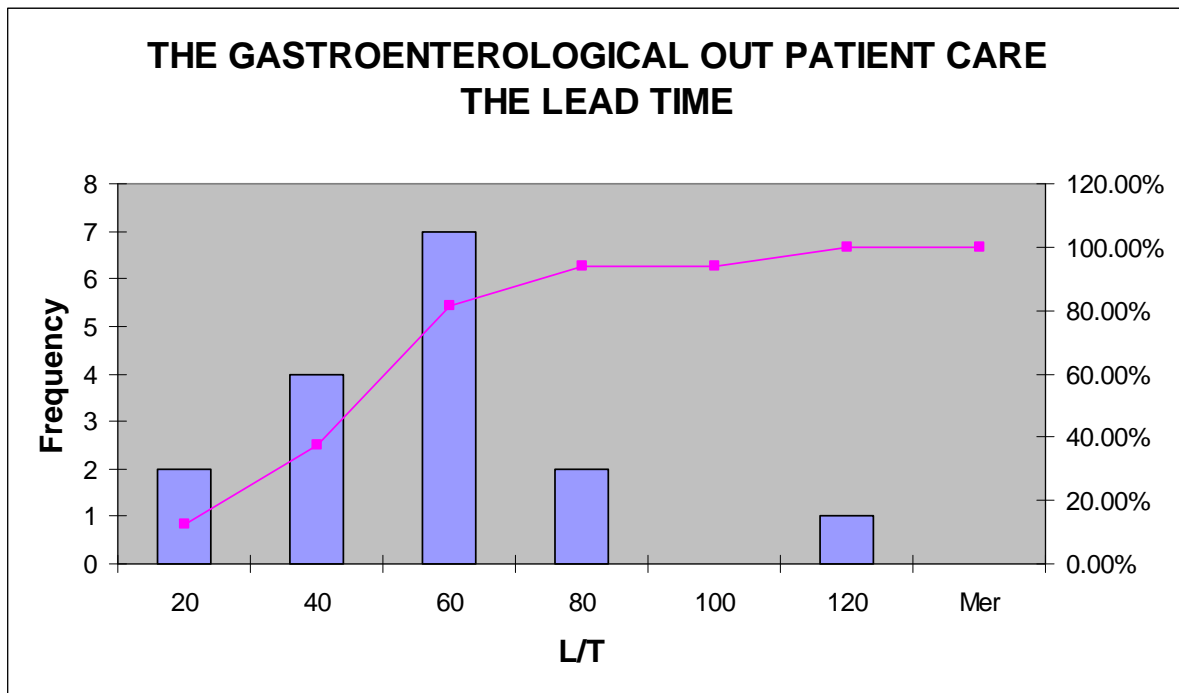
---

the system back into operation again. Some patients had to be re-scheduled to another day. Since it was not possible to reach these patients by phone in time, all of them met as scheduled.

Some patients are referred from the gastroenterology out-patient department to the oncology out-patient department. However, while data from the latter department are dependent on PIMS, the registration can differ from the reality. An example is that the registration of a patient's departure is not in accordance with the time the patient actually left (which could happen on a busy day).

The answers from the questionnaire show that the communication network is insufficient and unstable. An integration of the systems in use (as PACS, PIMS, Doculive, etc), with a simple iconography, would make them more user-friendly and improve the workflow. Delays seem to be related to the uneven arrival of the specialists or the patients, and the factor of receiving a closer assistance of the ancillary workers in general.

The span of the patient consultations is 17 minutes to 101 minutes (16 of 20 patient consultations). The average lead time is 45.25 minutes and the median is 44 minutes. The variance is 434.5 and the standard deviation is 20.84. The following bar chart shows the relation between the number of consultations and L/T:



**Diagram 4.4: The relationship between the frequency (the number of patients) and lead time (minutes)<sup>3</sup>**

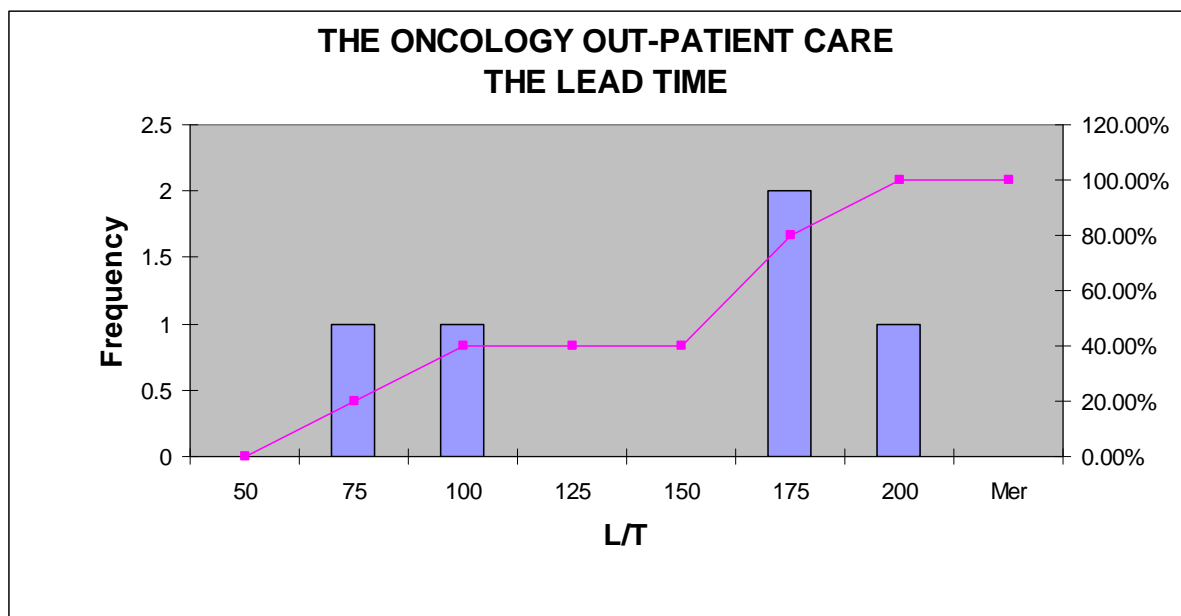
The diagram shows that the majority of the patient consultations lasts between 24 minutes and 66 minutes. There is a minor positive skewness, which indicates that in some cases the L/T is longer than the average lead time. The fixed working time (W/T) is 30 minutes, and this is noticeably less than the L/T average and the L/T median. The ratio of waiting time to C/O is 3.17; which means that the share of the waiting time is three times higher than the C/O. The proportion of “waste” in relation to L/T is 69.1%, and the V/A proportion is 30.9%. The value adding time is less than one third of the L/T.

To sum up: Delays were caused by a set of problems. The main factors which influenced the patient logistics within the gastroenterology out-patient department negatively were network communication problems, delayed start-up time

<sup>3</sup> Each pillar in the bar chart indicates a lead time interval, and each dot on the cumulative graph indicates the percentage frequency of the lead time gathered at each point and downwards (the L/T frequency).

(specialists), an emergency task (scarcity of specialists?), prolonged consultations and the uneven availability of assistance during performance of the core consultations. The network error was not insignificant for the outcome, and was the main cause of the long waiting time and of the re-scheduling of patients.

Even though the consultations in the oncology out-patient department are few, the following bar chart could give a general impression of the situation in this department:



**Diagram 4.5: The relationship between the frequency (the number of patients) and lead time (minutes)<sup>4</sup>**

The span of the patient consultations was 56 minutes to 192 minutes (5 of 8 patient consultations). However, some patient departures were not recorded. The average lead time is 128.8 minutes and the median is 151 minutes. The variance is 3246.7 and the standard deviation is 56.98. The bar chart shows that the majority of the

<sup>4</sup> Each pillar in the bar chart indicates a lead time interval, and each dot on the cumulative graph indicates the percentage frequency of the lead time gathered at each point and downwards (the L/T frequency).

patient consultations last between 57 minutes and 176 minutes. There is a negative skewness (the median is higher than the average), which indicates that L/T last less than the average L/T in some cases. The fixed W/T is 45 minutes, and this is noticeably less than the L/T average and the L/T median. The variance and the standard deviation appear to be high, which tells that the department probably has some challenges it needs to do something with.

#### **4.2.4 The Thorax-surgical out-patient department**

The thorax-surgical out-patient department is divided into three subunits; the thorax-heart out-patient unit, the aorta out-patient unit and the echo out-patient unit. These units are organized and coordinated by the thorax-surgical department, and they have separate patient lists. Each unit has been assessed separately in this survey.

The health personnel (both specialists and nurses) are attached to the thorax-surgical department, except the cardiologists, who are attached to the cardiology department. The counter at the surgical out-patient department performs the registration of patient attendance and departure. The number of patient consultations related to the thorax-surgical out-patient unit was 1147 consultations in 2005 and 1244 consultations in 2006 (Årsrapport, 2006). A flow diagram of the resource coordination within the thorax-surgical out-patient unit is shown in Appendix 9 (p. 95).

The data collection related to the thorax-heart out-patient unit took place in the course of one whole day and two half days. The registration was done from the “inside”, with the approval of the patients and the specialists. The standard consultation time was 20 minutes. The explanatory variables can be found in appendix 10 (p. 96).

---

5 out of 20 patients were first time appointments, 18 were recorded as control appointments, and one appointment was cancelled. The health personnel involved were a specialized surgeon and an assisting nurse. The nurse was usually occupied serving another specialist at the echo unit, and assisted the thorax-surgeon only when needed. The nurse was present for 53 minutes.

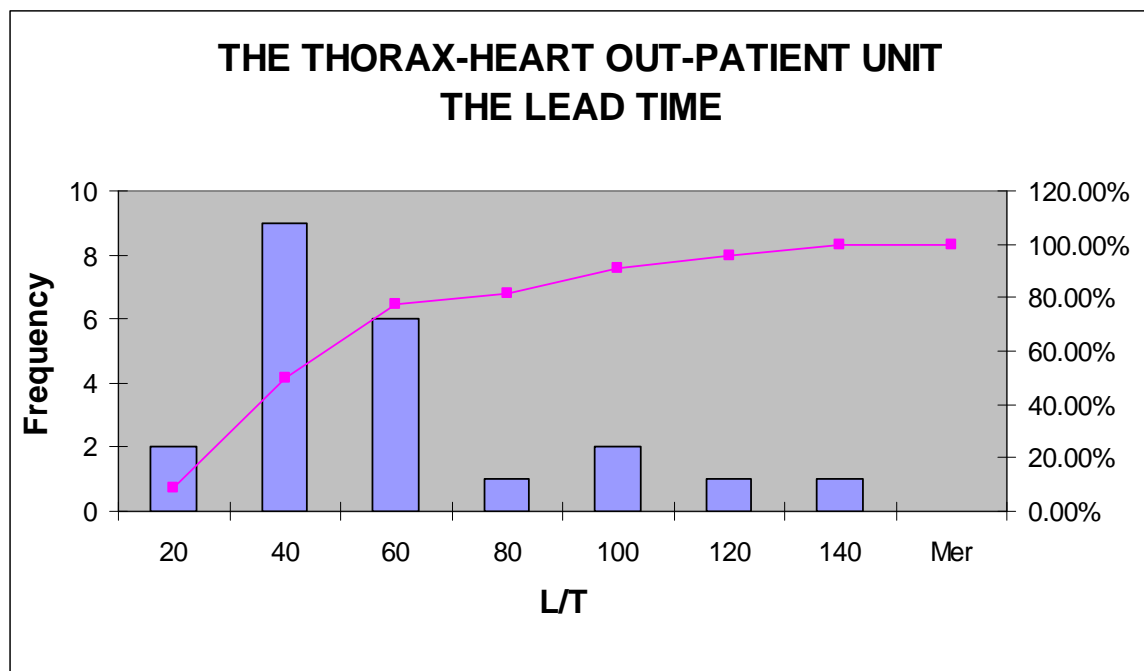
There were no events of double-booked patients, and available time prior to the consultations was 17 minutes. 3 patients were treated earlier than scheduled (43 minutes). Delayed start-up time amounted to 45 minutes, and medical assessments to 47 minutes (including beeper or telephone calls). Some of the consultations were prolonged, and one patient was in a way “over-booked” with cross-functional services. Medical descriptions were lacking in three cases; two from the neurological out-patient department and one from the radiology department

X-ray pictures were required for 18 patients and were usually taken a week before the consultation. Neurological examinations were required for 8 patients. They were usually performed the same day. However, some were performed up to 6 days before the consultation. A surgical consultation at the neurological department was required for one patient. Cardiological examinations, which are performed at the medical out-patient department, had not been performed before the consultations. Such examinations were required for 2 of the patients. 2 patients were to have aorta examinations. They had them done on the day of the consultation. Biomedical laboratory service and a gastro-surgical consultation had been ordered for one patient. This was coordinated the same day as the patient has his/her consultation. Hotel was required for 8 patients (24 hours).

The consultation room was technically independent on medical facilities, except for the communication network. An equipment trolley, which belonged to the thorax-surgical department, was brought along each time. There was no regular feedback to the surgical out-patient department about scheduled patients.

The answers to my questionnaire emphasize that delays often are caused by delayed descriptions, prolonged consultations and scarcity of rooms (resource area). The number of telephone (and beeper) calls, additional medical assessments and emergency tasks cause delays by squeezing an already tight working schedule. Patients who do not show up or are delayed affect the workflow too. The marking of waiting spaces and consultation rooms are in a way indistinct, and sometimes patients have problem orienting themselves. The network communication system at the surgical out-patient department is not connected to the communication system at the thorax surgical department (DATACOR). This affects communication negatively. The specialists often need to work independently because of the parallel consultations performed in the echo out-patient unit. Additional space and a closer location to the thorax-surgical department would have helped.

The span of the patient consultations is from 13 to 128 minutes (22 of 23 patient consultations). The average lead time is 49.05 minutes and the median is 41 minutes. The variance is 916.8 and the standard deviation is 30.28. The following bar chart shows the relation between the number of patients and L/T:



**Diagram 4.6: The relationship between the frequency (the number of patients) and lead time (minutes)<sup>5</sup>**

Approximately 65 % of the measurements are from 19 minutes to 79 minutes. There is a positive skewness, which indicates that L/T in some cases last longer than the average L/T. The fixed working time (W/T) is 20 minutes, and this is noticeably less than the L/T average and the L/T median. It appears to be some challenges in relation to “waste”, and the variance and the standard deviation appear to be high. In relation to “waste”, the ratio between waiting time and C/O is measured to 2.41, and the waiting time is approximately two and a half time higher than the C/O. The proportional share of “waste” in relation to L/T is 72.1%, and the proportion of V/A in relation to L/T is 27.9%.

<sup>5</sup>Each pillar in the bar chart indicates a lead time interval, and each dot on the cumulative graph indicates the percentage frequency of the lead time gathered at each point and downwards (the L/T frequency).

To sum up, these are the main factors which affected the patient logistics negatively. Scarcity of specialists, additional medical assessments, delayed start-up time (specialists), lack of test results and descriptions, in addition to prolonged consultations and restrictions in connection with the communication network.

#### **4.2.5 The aorta out-patient unit**

The data collection was performed during two half days. The registration was done from the “inside,” with approval from the patients and the specialist. The standard consultation time was 30 minutes. The overview of the explanatory variables can be found in appendix 11 (p. 97).

2 of the 12 patients were “first-time” appointments, and 10 patients were “control” appointments. There were no double-booking of patients, and 1 patient was treated earlier than scheduled (17 minutes). A surgeon and an assisting nurse were responsible for the service delivery. The nurse also served the echo out-patient unit. Delayed start-up time was 31 minutes. Beeper and phone calls took 6 minutes.

Radiological services were required for all the patients, and were performed 2 days in front of the consultation. Services required were CT and sometimes MR (only 1 patient). Neurological out-patient care was required for 8 patients, and was usually performed the same day. However, it could be performed up to 6 days before the consultation. One patient was required for a surgical consultation at the neurological department. Hotel was required for 4 patients, and 3 of the patients stayed for 2 days and 1 patient stayed for 3 days.

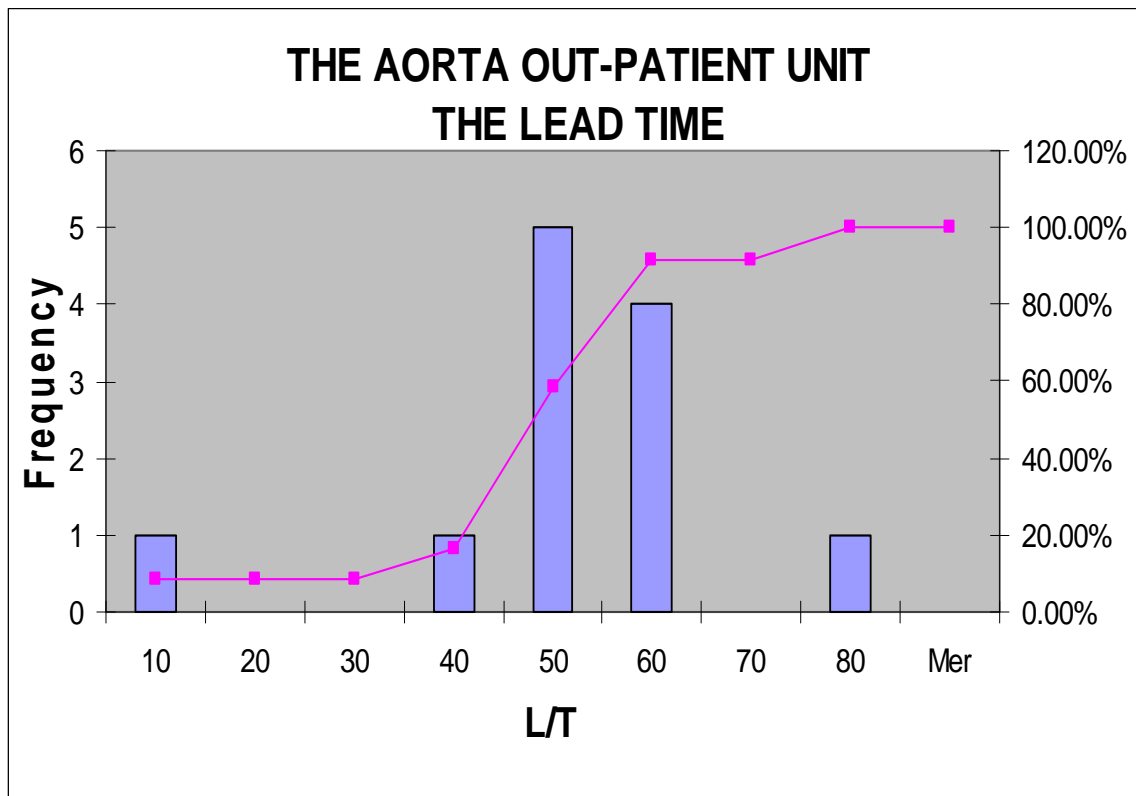
The consultation room was technically independent on medical facilities, except for the communication network.



---

The questionnaire replies from the aorta personnel are more or less the same as the replies from the thorax-heart personnel. Scarcity of rooms, prolonged consultations, interruptions by beeper and telephone calls and additional medical assessments affected the performance of the service negatively. The specialists have a tight programme running parallel to the out-patient care. Patients who did not show up and shortage of time between supporting services affected the service delivery negatively as well. The specialists work mainly independent, because the assisting nurse is occupied with the echo out-patient care.

The span of the patient consultations was 8 to 71 minutes (12 of 12 patient consultations). The average lead time was 46.83 minutes and the median was 47.5 minutes. The variance was 243.4 and the standard deviation 15.6. The following bar chart shows the relation between the number of patient consultations and the L/T:



**Diagram 4.7: The relationship between the frequency (the number of patients) and lead time (minutes)<sup>6</sup>**

The diagram shows that the majority of the consultations took from 31 to 62 minutes. There is a minor negative skewness, which indicates that in some cases L/T lasted less than the average L/T. The fixed working time (W/T) was 30 minutes, and this is much less than the L/T average and L/T median. The ratio between waiting time and C/O is 1.54, which means that the waiting time lasted one and a half time longer than the C/O. The proportion of “waste” in relation to L/T is 64.6%, and the proportion of V/A in relation to L/T is 35.4%.

To sum up: Two main factors which influenced the patient logistics negatively were delayed start-up time (specialists) and prolonged consultation time.

<sup>6</sup>Each pillar in the bar chart indicates a lead time interval, and each dot on the cumulative graph indicates the percentage frequency of the lead time gathered at each point and downwards (the L/T frequency).

---

#### 4.2.6 The echo out-patient unit

The data collection within the echo out-patient unit comprised two groups. The echo out-patient care consists of two sequential contact points, an echo examination and a surgical assessment. The standard time of the core consultations was scheduled to 2 x 15 minutes. However, there was additional time available between the scheduled consultations. The echo examination was performed before 12 o'clock and the surgical assessment after 12 o'clock.

The data collection was carried out both indirectly and directly. The data in group one is PIMS based, and include eight patients. The registration in this group has been calculated in the same way as for the oncology out-patient unit. Data collection in group two took place in the course of three days, and comprises 6 patients (two patients each day). The registration was done from the "inside," with approval from the patients and the specialists. An overview of the explanatory variables can be found in Appendix 12 (p. 98). The following description is based on the data from group two.

How many patients who were "first-time" appointments were difficult to determine. When the external waiting time rose above a certain time limit (approximately 14 months), the computer system automatically closed the referral. Then the referral had to be opened again, to give the patient a new appointment. Thus, the patient consultation would be recorded as a "first-time" appointment, even though the waiting time had been long for some of the patients. (It can be added that when patients have finished their treatments, the referrals need to be "closed" in the computer system too. Otherwise the patients would remain on the waiting lists and cause error in the overall registration.) (Cf. Beate Bremnes, coordinator at the surgical out-patient department, 2007).

A cardiologist performed the echo examination and a surgeon performed the surgical assessment. An assisting nurse performed some independent procedures before the echo examination took place (taking blood pressure, ECG (electrocardiogram), collecting additional information). The nurse was supposed to serve the parallel thorax-heart out-patient unit. However, most of the time the nurse was occupied with the echo care.

The average examination time of the echo-test was approximately 25 minutes.

Waiting time was 74 minutes. The cardiologist was required twice at the operational theatre in connection with emergency tasks (2 x 30 minutes). Among other factors, there was network communication problems connected with the transfer of data from the echo machine. The description from this procedure is scanned at the cardiology laboratory. However, the cardiologist became “tied up” with manual procedures related to the handing over of information on floppy disks. Events of beeper or telephone calls amounted to 8 minutes.

Test replies and descriptions, from the echo examination as well as from supporting services, normally arrived late. One patient was required twice to the radiology department because the first pictures taken were inadequate. Another patient returned because the requisition for laboratory service was missing. Also research work resulted in some delay.

Scarcity of consultation rooms made it necessary to move the patients around, either to another consultation room at the surgical out-patient department or even to the thorax-surgical department. (Sometimes the patients were moved twice within the departments). In addition, scarcity of surgeons resulted in the re-scheduling of staff. Surgeons were either occupied in the operating theatre or in the emergency ward. Once, the surgical assessment was handed over to the surgeon who was carrying out the aorta out-patient care the same day. This specialist had stepped in on short notice

---

(though yet behind time) because of scarcity of specialists in the aorta out-patient unit as well this day. In addition, when the national regulation of the one hour waiting time is overstepped, it can not be claimed any co-payment from the patient (Lovdata, 2007). This was the case for all six patients in group two. Some patients thought they had been forgotten when they had to remain at the hospital (almost) for the whole day before they were taken care of.

Radiological services were required for all the patients, and were usually performed the same day, before the echo examination. Services required were x-ray and/or CT. Biomedical laboratory tests were required for all the patients too, and were usually taken the same day ahead of the echo examination. Hotel was required for 2 patients, and lasted for 24 hours for both of them.

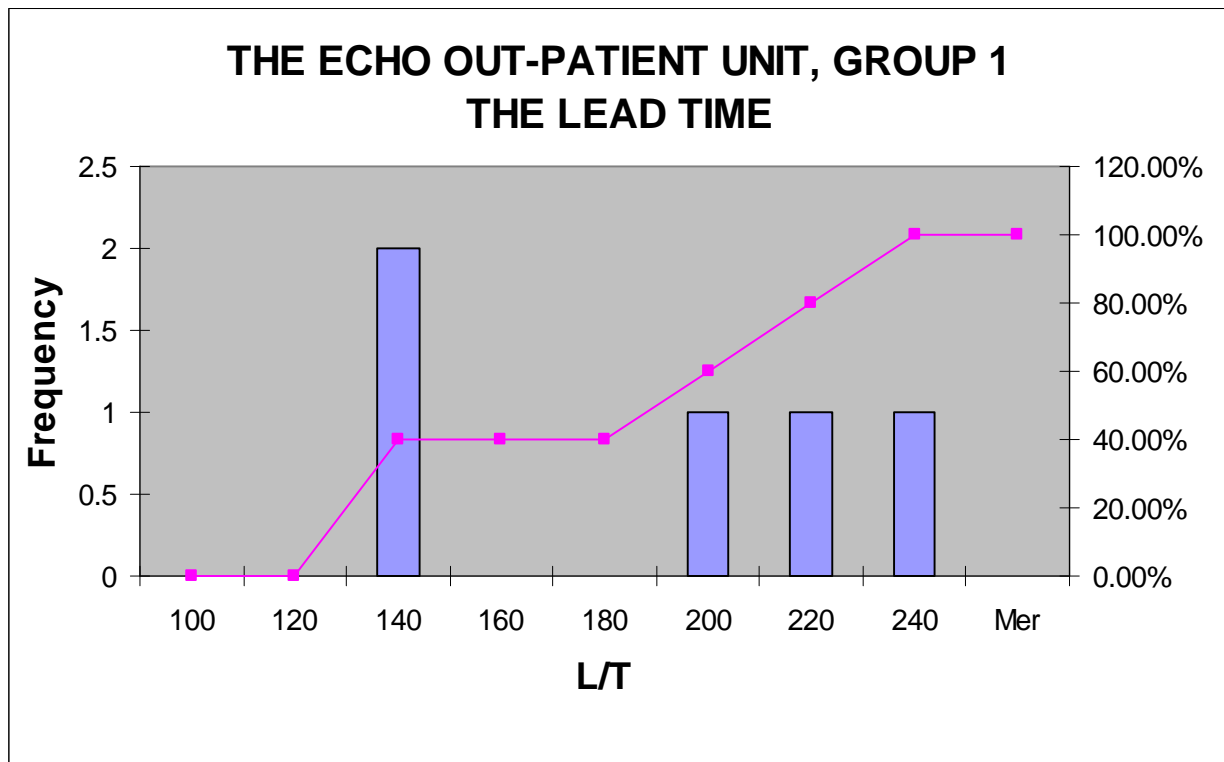
The consultation rooms were partly independent on medical facilities, except for the communication network. An echo machine was placed at the surgical out-patient department, and some medical equipment was brought from the thorax-surgical department by a nurse. There were some challenges in connection with the echo examination. Three days a week, this examination was performed in the surgical out-patient department. The two other days, the examination was performed in a room near the thorax-surgical department. The data transmission was problematic at both places. However, the main challenge was the examination room near the thorax-surgical department. This was a provisional solution, which had lasted for nearly two years. The examination room was unsuitable, both for patients and personnel. It was an untidy room lacking satisfactory electrical solutions, and it was not possible to transfer data to this room from the echo machine. Some patients did not want to leave the waiting area because they did not believe they could find their way back to the room. The echo machine and additional equipment were at the same floor though.

The “scheduled” waiting time between the echo-examination and the surgical assessment, was 327 minutes for all the patients in total. The real time was 831 minutes in total (average waiting time: 138.5 minutes, and median waiting time 117.5 minutes).

The replies from the questionnaire shows that there were similar problems here as there were in the examination room near the thorax surgical department. Usually, it was performed two patient consultations each day (five days a week), which in a wider sense lead to longer waiting lists. Scarcity of specialists and a tight working schedule result in delays. A main restriction is delayed test results or descriptions. Improvement possibilities are related to the space and the workflow: A more seamless treatment line with consultations scheduled on fewer days (for instance 5-6 consultations one day at the end of the week). However, this needs to be coordinated with the activity at the operating theatre. An estimated consultation time for an echo examination is approximately one hour, which presupposes a sufficient network for transmission of data and stationary medical equipment. A medical criterion which makes it easier to sort out patients who needed surgical assessment could relieve some of the pressure on this out-patient unit. Capacity constraints in some of the supporting units, for instance in connection with cardiological supervisions, occasionally result in hospitalization when it is necessary to have these services performed in time (the patient’s medical condition taken into account).

The span of the patient consultations within the first group was 126 minutes to 222 minutes (5 of 8 patient consultations). The average lead time was 174 minutes and the median 191 minutes. The variance is 2040.5 and the standard deviation is 45.17.

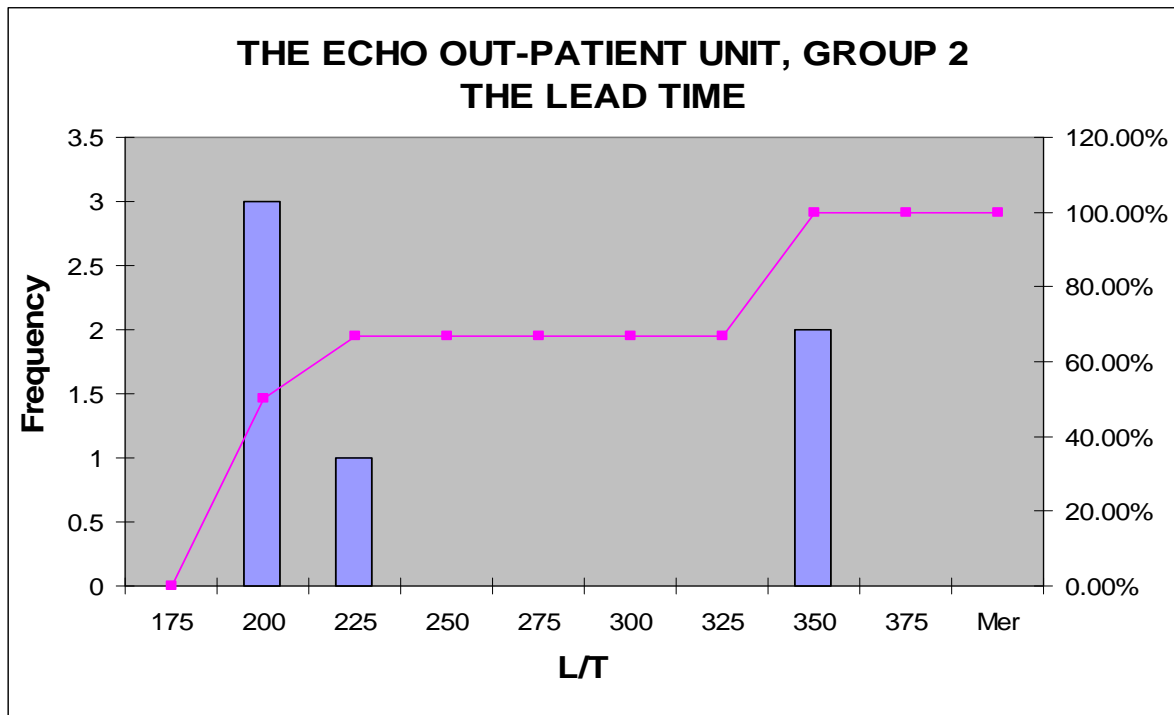
The span of the patient consultations within group 2 was 176 to 349 minutes (6 of 6 patient consultations). The average L/T is 240.83 minutes and the L/T median is 203 minutes. The variance is 6295 and the standard deviation is 79.34. The following bar charts show the relation between the number of consultations and L/T:



**Diagram 4.8: The relationship between the frequency (the number of patients) and lead time (minutes) in group 1<sup>7</sup>**

Approximately 65 % of the patient consultations in group one is in the interval 129 to 219 minutes. There is a negative skewness, which indicates that L/T lasts less than the average L/T in some cases. In comparison with group two, the majority of the patient consultations are in the interval of 161 minutes to 320 minutes. However, in group two there is a positive skewness, which indicates that L/T lasted longer than the average L/T in some of the cases:

<sup>7</sup> Each pillar in the bar chart indicates a lead time interval, and each dot on the cumulative graph indicates the percentage frequency of the lead time gathered at each point and downwards (the L/T frequency).



**Diagram 4.9: The relationship between the frequency (the number of patients) and lead time (minutes) within group 2<sup>8</sup>**

The fixed working time (W/T) is scheduled to 2 x 15 minutes per patient, and this is much less than the L/T average and L/T median in both groups. Thus there appears to be a great challenge in relation to “waste” here. The ratio between waiting time and C/O (in group two) is 10.4, which indicates that the waiting time is more than ten times longer than the C/O. The variance and the standard deviation in both groups are high too (especially in group two). The proportion of “waste” in relation to L/T is 75.7 %, and in relation to V/A it is 24.3 %. The patient logistics is apparently far from satisfactory within this out-patient care service.

<sup>8</sup> Each pillar in the bar chart indicates a lead time interval, and each dot on the cumulative graph indicates the percentage frequency of the lead time gathered at each point and downwards (the L/T frequency).



---

To sum up: It was reasonable to divide the patient consultations into two groups, because the method of data collection was different. The data-collection was quite time-consuming and there are therefore few patients within each group. The main factors which have a significant negative influence on the logistical outcome are found in group 2. Scarcity of specialists, delayed start-up time, emergency tasks, network communication problems, delayed test replies and/or descriptions and problems with space and/or facilities

### 4.3 “The Whole Picture”

Among the main factors which influenced the patient logistics negatively in the different out-patient departments I have studied, was delayed start-up time the most important. Delayed start-up time was in some cases due to the fact that specialists had been “diverted” to emergency tasks in the operating theatre. Internal and external medical assessments (including beeper and phone calls) were in some of the units of great importance. Double-booking of patients could cause additional stress. It can not be excluded that delayed start-up time could be caused by failing punctuality of personnel or patients.

Prolonged consultation time was another delaying factor. It could be caused by challenges related to the working area and/or the facilities. Medical equipment was in some services a restricting factor. Delayed patients and no show ups, could in some play a role, as could patients’ who just did not find the room they were to go to. In some cases, patients were delayed because a department was not able to coordinate the use of resources that were to be used for different purposes and patients. Some think that the demand for radiology services has increased to more than the capacity of the radiology department (especially for CT services).

Communication problems also have a negative influence on the logistics. The changeover increases the operating costs, and for that reason it needs to be assessed according to the value chain model and lean principles (mentioned as “type 1 Muda” or “slack”) (Cf. section 2.2 and 2.4). In one case, there was network error. We have seen that the change over time (C/O) in some cases could be high because of network user problems, network disconnections or simply the network structure as a whole. It is likely that a more united and user-friendly network system could have improved the communication exchange and thereby the workflow. Missing or delayed test results and medical descriptions were in some of the out-patient units apparent. The physical location of rooms could also have negative impact on the communication exchange. The feedback routines of the counters about delays were varying. Feedback routines regarding space utilization and activity plans were also often poorly developed. Resource coordination depends on a user-friendly network system, which has sufficient capacity to run overviews of waiting lists, available resources, in addition to acquiring and transmitting information.

The following table gives an overview of the results of my analyses:

OUT-PATIENT CARE SERVICE	W/T	L/T AVERAGE	L/T MEDIAN	L/T	“Waste” percentage of L/T	V/A percentage of L/T	REMARKS
				Variance			
				Standard deviation			
ORTHOPEDECS	20-30	24.9	21	186.9	45.2	54.8	40 of 43 patients
				13.67			
UROLOGY	30	39.65	36.5	219	56.8	43.2	25 of 31 patients
				14.8			
GASTRO-ENTEROLOGY	30	45.25	44	434.5	69.1	30.9	16 of 20 patients
				20.84			
ONCOLOGY	45	128.8	151	3246.7			5 of 8 patients
				56.98			
THORAX-HEART SURGERY	20	49.05	41	916.8	72.1	27.9	22 of 23 patients
				30.28			
AORTA	30	46.83	47.5	243.4	64.6	35.4	12 of 12 patients
				15.6			
ECHO: GROUP 1	2 x 15	174	191	2040.5			5 of 8 patients
				45.17			
ECHO: GROUP 2	2 x 15	240.83	203	6295	75.7	24.3	6 of 6 patients
				79.34			

Table 4.10: The results of the analyses related to the different out-patient care services, using L/T as the dependent variable.

The patient is supposed to occupy centre place in the cycle of care. Yet, we see that the percentage of value added time (V/A) in almost every out-patient department or unit is below 50%. The least poor result is to be found in the orthopaedic department, where 54.8% of the time is used directly to care for patients (V/A). The results in the thorax-surgical department are particularly poor, where just 24.3% of the time are used directly on patient interaction. For all the departments and units taken as a whole the average value adding time percentage is only 36.1. It is also of importance that the V/A time proportions are characterized by high variance and high standard deviation.

The results undoubtedly reflect the complexity of coordination in a specialized out-patient clinic. Nevertheless, the patient is the one who is the biggest “looser” in this complexity game. Time is valuable also for the patients (cf. section 2.4.2 and 2.4.3), and it is “the patients” who pay taxes and finance the health care. Patients’ medical condition may also be such that long waiting time in itself may become a mental and even physical burden. The aim, therefore, must be to make the proportion of “waste” as small as possible. This means that the changeover time (C/O) and the waiting time must be reduced as much as possible ( $C/O + \text{Waiting time} + \text{Interruptions} = \text{Waste}$ ).

The lead time (L/T) is useful as an overall indicator of efficiency and quality (cf. section 2.1, 2.3, and 2.4). However, it cannot be used uncritically. The numbers could be manipulated, for instance by using additional, but unnecessary, resources. But doing so, also add to the total bill. Therefore, my conclusion is that there is much to be gained by using value adding time as a major indicator of efficiency (productivity) as well as quality.

## **5. WORKING TOWARDS A BETTER PATIENT CARE**

Poor patient logistics, observed as waiting time, causes an economic loss to patients and society and lead to reduced service quality for patients. To get a more precise impression of how good the logistics is, and in which direction it is developing, we need a good quantitative indicator. Our analyses have showed that the so-called lead time (L/T) appears to be a suitable indicator of logistical quality. It is then also an indicator of where interventions need to be made (first) to improve the situation.

### **5.1 Reflections on the Findings**

Coordination in specialized out-patient clinics has become a very demanding task. Personnel, room and technology specialization, as well as multiple uses of these resources, lead to diminishing flexibility. It may add to the problems if the patient mix is too varied. In chapter four I have identified a number of factors that give rise to coordination problems, or “waste”. Any efforts to improve the logistics in the departments and units I have studied, should take these findings as the points of departure.

In the orthopaedic out-patient unit, the main challenge seemed to be related to the space. A possible improvement could be to combine two separate consultation rooms with an additional procedure room (by doors). In that way, two specialists can work in parallel to each other and simultaneous to the performance of medical procedures, performed by the nurse and/or the technician. This could lead to less patient transfers and less delays. In the situation where a physiotherapist and another technician (who adjust patient equipments) share the same room at the same time, separate rooms (by doors) would give the necessary shielding for the patients, and improve the working conditions as well.

In the urological out-patient unit, there were especially problems related to the location of the working space and the adjustment of health personnel. Two specialists were assisted by one nurse each, and shared two therapists and a nurse in the surgical ward. Nevertheless, when the workload was too high, it was necessary to intervene with extra space and additional personnel. The urological therapist performed procedures of a more extensive nature, and was interacting more closely with the specialists than the assisting nurses. Further, the number of health personnel involved could increase the number of patient transfers. Less ancillary workers could possibly improve the patient-flow and secure the communication exchange, both for patients and personnel. For instance, by strengthen the competence by an additional urological therapist, this could possibly better harmonize the demand for procedures and assistance. Linking the localization of rooms closer together and thereby reduce the space, could secure the supply of services; the utilization of resources (as area, personnel and medical equipment) and improve the “flow” of the work cycles.

The gastroenterology and oncology out-patient units could possibly gain from a closer collaboration. The demand for and pressure on these out-patient units has increased, and the main challenge now is to avoid poor patient logistics. The personnel worked mostly independently, and the communication exchange was restricted. By establishing a steady team, consisting of experienced personnel, it could contribute to clarifying needs and expectations. Clarification of routines could lead to improvements in work distribution and quality. The introduction of a feedback routine in connection with the utilization of the (assigned) area within the surgical out-patient department should be considered. More flexibility regarding the allocation of the spatial resources, could improve their utilization. A more flexible space resource management could also prevent a situation where rooms remained unused.

---

Scarcity of specialists was most obvious in the thorax-surgical out-patient department. The medical progress within this highly specialized field has brought along a more resource demanding and time-consuming service provision. During the last years, more time-consuming and complex surgical operations have been performed, and it has gradually increased the need for specialists (surgeons as well as medical specialists). A satisfactory network communication system for medical data acquisition and transmission is of great importance to avoid manual routines (as telephone calls or personal delivery of floppy disks). This to ensure that test results and descriptions, closely attached to the core service, are available and received in time. However, multifunctional coordination could create shortage of time and thereby cause a quality gap and increase costs (Cf. the national regulation of waiting time). To improve the logistical outcome, it is important to keep the causes of “waste” and the six S-activities in mind; Sort, Simplify, Sweep, Standardize, Sustain and Safety (C.f section 2.4). A main question to consider is whether the patients should be treated individually, in series or in a multidisciplinary way.

My survey shows that the responsibility for the resource coordination within the surgical out-patient care is divided among several medical departments. In a wider sense, this influences the running resource adaptation and thereby the patient logistics. A “patient journey” often involves an extended network of clinicians (Cf. example section 4.1.2), and an objective is to ensure that resources are utilized “just in time”. To secure a continuous health care service delivery, it is necessary to ensure that essential medical information is available and follows the patient throughout the whole treatment process (end-to-end). For instance, a superior structure of resource coordination, for instance gathered in a separate department, might be suitable to ensure the linkage across different parts of the service delivery. This could smooth the path of functional integration (the horizontal integration) and

improve the “flow” within the treatment processes; so saying, improve the patient logistics by more seamless handing-over procedures.

## 5.2 Conclusion

The combination of SCM and lean principles makes the patient into something more than numbers and costs. When the patient is placed in the centre, as the main subject for planning and performance, it means that quality and efficiency is placed here too.

The result of my study shows that in most of the out-patient departments, less than 50% of the time is used directly for patient care (the value added time). The potential for improvements is thus great. A study like this also raises the question of how representative it is of what takes place in Norwegian hospital out-patient departments. Even if my study is a study of some departments in a very specialized hospital, I will hazard the guess that it does not deviate much from what we can find in other out-patient departments, especially in the larger hospitals. If my guess is correct it shows that there is much to be gained, both in terms of quality of care and in terms of cost-efficiency nationally. Even a 10 to 20 percent improvement would make a significant difference.

My study demonstrates that the lead time (L/T) is an indicator which can be useful to assess the quality of coordination in out-patient departments. It should be more widely used as a “diagnostic” measure and as a basis for “therapeutic” interventions. However, it is of importance to keep in mind that the lead time can not be measured by relying on the administrative computer system alone. It is necessary to have recourse to an additional method of data collection if one is to get valid results.



---

To assess the potential of this method of “diagnosing” the quality of coordination in out-patient clinics more studies, and more refined and extensive studies, need to be done. To use this diagnostic method as a basis for improvements in care coordination much must be done to develop and test different kinds of interventions. Such therapeutic experiments should probably start in several local settings. As one gathers information and learns, such experiments can be carried out on a larger scale. It is probably of great importance that the health care personnel that is most directly involved in the health care provision that is to be “diagnosed” and improved upon, take an active part both in the diagnostic and the therapeutic experiments that I am here suggesting. They should not just be studied and talked to by outsiders. They should be mobilized to become the real masters of their own future. To some extent this also applies to patients. Here, as in so many other walks of life a bottom-up approach has a great potential.

## 6. TABLE OF AUTHORITIES

Anderson,J., (2001): *“Tools for Improved Performance in the Supply Chain”*, Lund University, Department of Industrial Management and Logistics, Division of Engineerin Logistics, Sweden

Berg,Ole, (2007): *“Trying to Save Leftist Access Policy with Rightist Organizational Policies”*, University of Oslo.

Bicheno,J, (2000): *“The Lena Toolbox, Towards Fast, Flexible Flow”*, Buckingham, 2<sup>nd</sup> edn, Picsie Books

Bozdogan,Dr.K., Milauskas,R., Mize,DrJ., prif.Nightingale,D., Tanjea,A.,  
Tonaszuck,D, (2000): *“Transitioning to A Lean Enterprise: A Guide for Leaders”*, Volume 3, Roadmap Explorations, Massachusetts Institute of Technology, 2000

Brewer,A.M., (2001): “Ch.8: “The concept of value: Symbolic artefact or useful tool?”, in *“Handbook of Logistics and Supply-Chain Management”*, Brewer,A.M., Button,K.J, Hensher,D.A, Elsevier Ltd, U.K

Brewer,A.M., (2001): “Ch 22: “ Organizational logistics: Definition, components, and Approaches”, in *“Handbook of Logistics and Supply-Chain Management”*, Brewer,A.M., Button,K.J, Hensher,D.A, Elsevier Ltd, U.K

Brønn,P.S, Berg,R.W., (2005): *“Corporate Communication. A Strategic Approach to Building Reputation”*, 2<sup>nd</sup> edition, Gyldendal Norsk Forlag AS.

Christopher,M. (1998): *“Logistics and Supply Chain Management, Strategies for Reducing Cost and Improving Service”*, Prevtice Hall, 2<sup>nd</sup> edition, 1998.

Fritt sykehusvalg Norge, *”Kvalitetsindikatorer”*,  
<http://www.sykehusvalg.no/sidemaler/>, Reading date: 13.04.2007-14.05.2007

---

Gillen,D., (2001): “Ch 20: “Benchmarking and performance measurement: The role in quality management”, in “*Handbook of Logistics and Supply-Chain Management*”, Brewer,A.M., Button,K.J, Hensher,D.A, Elsevier Ltd, U.K

Hagen,T., Iversen,T. (2001): “*Sykehusenes effektivitetsutvikling 1992-1999: Hvilke effekter ga innsatsstyrt finansiering?*”, Skriftserie 2001:5, SINTEF Unimed NIS Helsetjenesteforskning

Hagen,T., Iversen, T. (1996): ” *Modeller for finansiering av sykehustjenester*”, i Sosialøkonomen nr. 10.

Hagen,T., Kjekshus,L.E., (2003): ”*Ga sammenslåing av sykehus bedre effektivitet?*”, HORN, skriftserie 2003:2, Universitetet i Oslo; Institutt for helseledelse og helseøkonomi, SINTEF Unimed

Jones, Mitchell, (2006) : “*Lean thinking for the NHS*”, (a report commissioned by the NHS Confederation), Lean Enterprise Academy, U.K

Lambert,D.M., (2001): “Ch. 7: “The supply chain management and logistics controversy”, in “*Handbook of Logistics and Supply-Chain Management*”, Brewer,A.M., Button,K.J, Hensher,D.A, Elsevier Ltd, U.K.

Lambert,M., Stock,J.R., Ellram,L.M., (1998): “*Fundamentals of Logistics Management*”, McGraw-Hill Companies.

Lewis,A.G. (2001): “*Streamlining Health Care Operations. How Lean Logistics Can Transform Health Care Organizations*”, Jossey-Bass, San Fransico.

Lovdata, ”*Forskrift om godtgjørelse av utgifter til legehjelp som utføres poliklinisk ved statlige helseinstitusjoner og ved helseinstitusjoner som mottar driftstilskudd fra regionale helseforetak*”, <http://www.lovdata.no/cgi-wift/wiztldrens?usr/www/lovdata/for/sf/ho/to-20001201-1>, Reading date: 26.04.2007

Løwendahl,B.R., Wenstøp,F.E, (et.al.) (2003): “*grunnbok i strategi*”,N.W.Damm & Søn

Martin;C., (1998): “*Logistics and Supply Chain Management. Strategies for Reducing Cost and Improving Service*”, 2<sup>nd</sup> edition, Pearson Education Limited, England.

McManus, Millard, (2002): “*Value Stream Analysis and Mapping for Product Development*”, Massachusetts Institute of Technology

Nasjonalt kunnskapssenter for helsetjenesten, ”307 Informasjonsbank for kvalitetsindikatorer; Kunnskapsgrunnlag for utvikling og bruk av kvalitetsindikatorer i spesialisthelsetjenesten”,  
<http://www.justmake.no/printerfriendly.php?aricleid=363&kundeid=841>, Reading date: 13.04.2007

Nasjonalt kunnskapssenter for helsetjenesten, “*Pasienterfaringer ved somatiske poliklinikker I Helse Øst, Sør og Midt-Norge – Institusjonsvise resultater*”, Pasopp-rapport nr 5-2004.

Nasjonalt kunnskapssenter for helsetjenesten; ”*Pasientene er godt fornøyde med poliklinikkene*”, <http://www.kunnskapssenteret.no/index.php?back=2&artikkelid=24>, Reading date; 20.03.2007

Norsk pasientregister (2007): <http://www.npr.no>, Reading date 02.09.2007

Porter,M.E. (1985): “*Competitive Advantage: Creating and Sustaining Superior Performance*”,New York Press, 1985.

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

Rother,M., Harris,R.(2001): “*Creating Continuous Flow, an action guide for managers, engineers & production associates*”, The Lean Enterprise Institute, Cambridge, Massachusetts, USA, 2001

---

Rother,M., Shook,J. (1999) “*Learning to See, value stream mapping to add value and eliminate muda*”, The Lean Enterprise Institute, Brookline, Massachusetts, USA.

Salzman, Rhonda A. (2002): “*Manufacturing System Design: Flexible Manufacturing Systems and Value Stream Mapping*”, Master of Science in Mechanical Engineering, Massachusetts Institute of Technology

SINTEF Health Research, 2005, <http://sintef.no>, Reading date: 13.04.2007-14.05.2007.

Sosial- og helsedirektoratet, ”*Nasjonal strategi for kvalitetsforbedring i sosial- og helsetjenesten....og bedre skal det bli*”, 2005

Stainer,A.: “*Logistics – a productivity and performance perspective*”, an Emerald FullText Article, International Journal Volume 2 Number 2 1997 pp. 53-62, <http://www.emeraldinsight.com/Insight/ViewContentServlet?Filename=Published/Em>, Reading date: 01.12.2006.

Swayne,L, Duncan,W.J, Ginter,P.M, (2006): *Strategic Management of Health Care Organizations*, Blackwell Publishing.

Taylor,D., Brunt,D, (eds.) (2000), *Manufacturing operations and supply chain management – the lean approach*, International Thompson Business Press

Årsrapport 2006, (2006), “*Årsrapport 2006, Kirurgisk poliklinikk*”, Dagfinn Albrechtsen, Merete Engeseth

## 7. APPENDIXES

**Appendix no. 1:** The questionnaire used in the survey; **page 87**

**Appendix no. 2:** A flow diagram of the resource coordination within the tentative G.I.D process in relation to “the cycle of care”; **page 88**

**Appendix no. 3:** A flow diagram of the resource coordination within the orthopaedic out-patient care service; **page 89**

**Appendix no. 4:** Table of the explanatory variables and measurements related to the orthopaedic out-patient care service; **page 90**

**Appendix no. 5:** A flow diagram of the resource coordination within the urology out-patient care service; **page 91**

**Appendix no. 6:** Table of the explanatory variables and measurements related to the urology out-patient care service; **page 92**

**Appendix no. 7:** A flow diagram of the resource coordination within the gastroenterology out-patient care service and the oncology out-patient service; **page 93**

**Appendix no. 8:** Table of the explanatory variables and measurements related to the gastroenterology out-patient care service and the oncology out-patient care service; **page 94**

**Appendix no. 9:** A flow diagram of the resource coordination within the thorax-surgical out-patient department, including the subunits; the thorax-heart out-patient unit, the aorta out-patient unit and the echo out-patient unit; **page 95**

**Appendix no. 10:** Table of the explanatory variables and measurements related to the thorax-heart out-patient care service; **page 96**

**Appendix no. 11:** Table of the explanatory variables and measurements related to the aorta out-patient care service; **page 97**

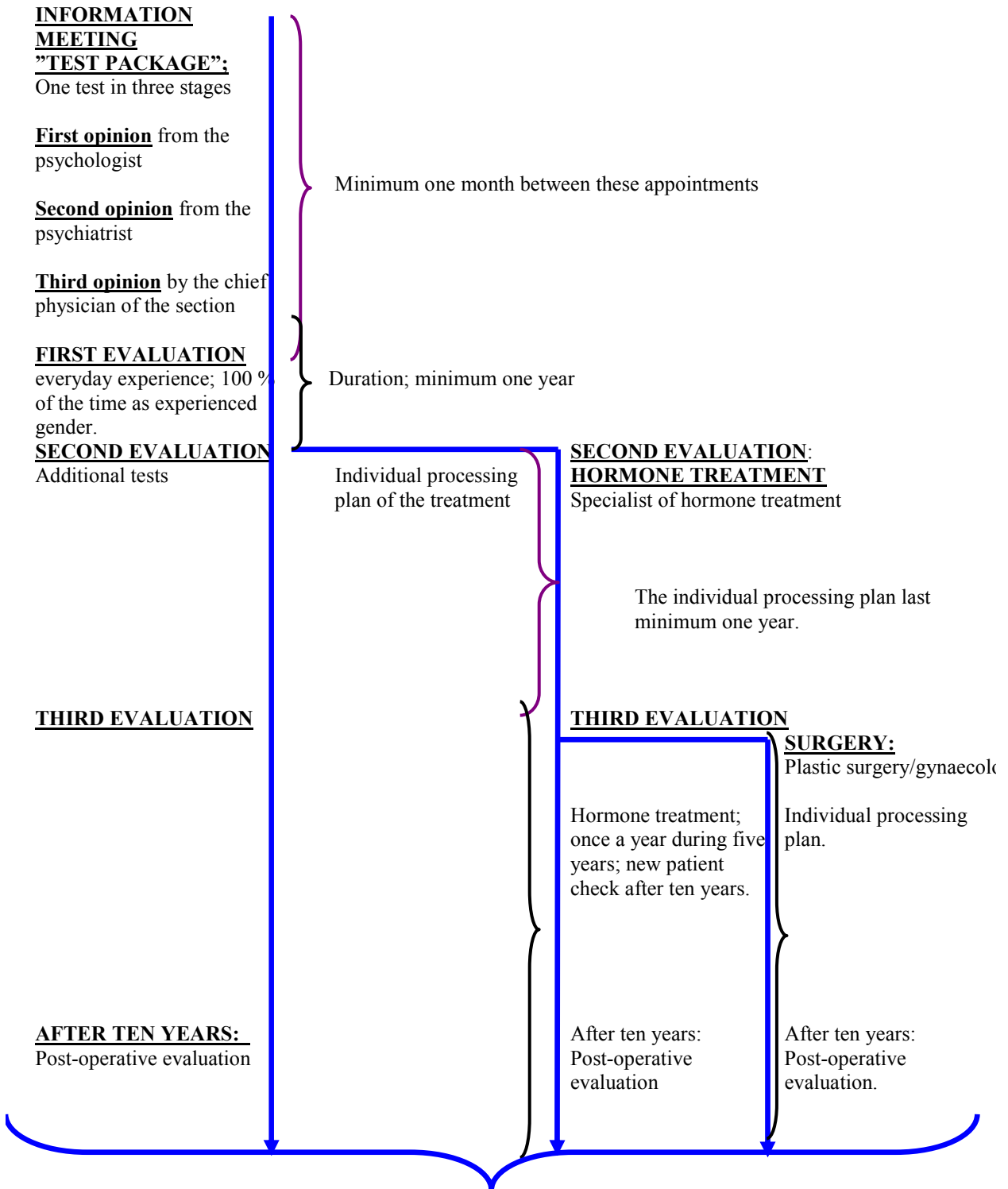
**Appendix no. 12:** Table of the explanatory variables and measurements related to the echo out-patient care service; **page 98**

<b>”MASTERGRADSPROSJEKT”: RESSURSBEHOV OG RESSURSKOORDINERING</b>		
<b>PERSONELL</b>	Lege/Spesialist	
	Sykepleier/Spesialsykepleier	
	Annet:	
<b>PASIENTGRUPPE</b>		
<b>Hva oppleves å være de største utfordringene med hensyn til dags-/ukesplan (planlagt aktivitet) og pasientflyt (faktisk aktivitet)?<sup>1</sup></b>		
<b>Pasientbookingen</b>	Pasientvolum liste	
	Konsultasjonstid per pasient	Ny konsultasjon
		Kontroll konsultasjon
		Dobbelbooking tid
Bookingsystemet (PIMS)	Annet:	
<b>Medisinskteknisk utstyr</b>	Underkapasitet mht tilgang ved behov	
	Bruksvennlighet	
	Mangel på nødvendig medisinskteknisk utstyr	Hvilken type utstyr?
<b>Romkapasitet</b>	Antall konsultasjons- og prosedyrerom	
	Brukervennlighet	
<b>Planløsning i enheten</b>	Ergonomi	Arbeidssituasjon
		Pasientvennlighet
	Avstand mellom ulike rom knyttet til pasientgruppe og ulike funksjoner knyttet til behov under konsultasjon.	
<b>”Avbrudd” under konsultasjon</b>	Pasientorientering: ”Merking” av venteplasser og behandlingsrom.	
	Telefoner, personsøk	
	”Fysisk avbrudd” ved beskjeder	
	Ø-hjelp	
	Annen intern assistanse i klinikken	
	Annen eksternt assistanse; sengepost, poliklinisk enhet	
	Undervisning, forskning	
Annet:		
<b>Pasientoppmøte</b>	Pasienter som ikke møter til avtalt konsultasjon	
	Pasient forsinket pga annen avtalt støttefunksjon eller poliklinisk behandling ved sykehuset-	
<b>Kommunikasjonsflyt</b>	Støttefunksjoner	
	Koordineringsfunksjon	
	Administrasjon/Ledelse	
<b>Annet?</b>		
<b>Jfr. Ovennevnte spørsmål og svar, hva er viktigst å prioritere?</b>		

<sup>1</sup> Sett kryss (X) i ruten ved de ulike alternativene som du opplever influerer mest, samt eventuell kommentar. Benytt baksiden for tilleggs kommentarer.

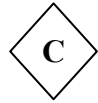
**A TENTATIVE DESCRIPTION OF THE GENDER IDENTITY DISORDER (G.I.D)**  
**TREATMENT PROCESS**  
**(C.f Liv Helgaker, specialized nurse, The National University Hospital, 2007)**

The referral is received from the G.I.D-coordinator;  
 Approximately one month from the date of the referral.  
 to the first consultation with the specialized nurse

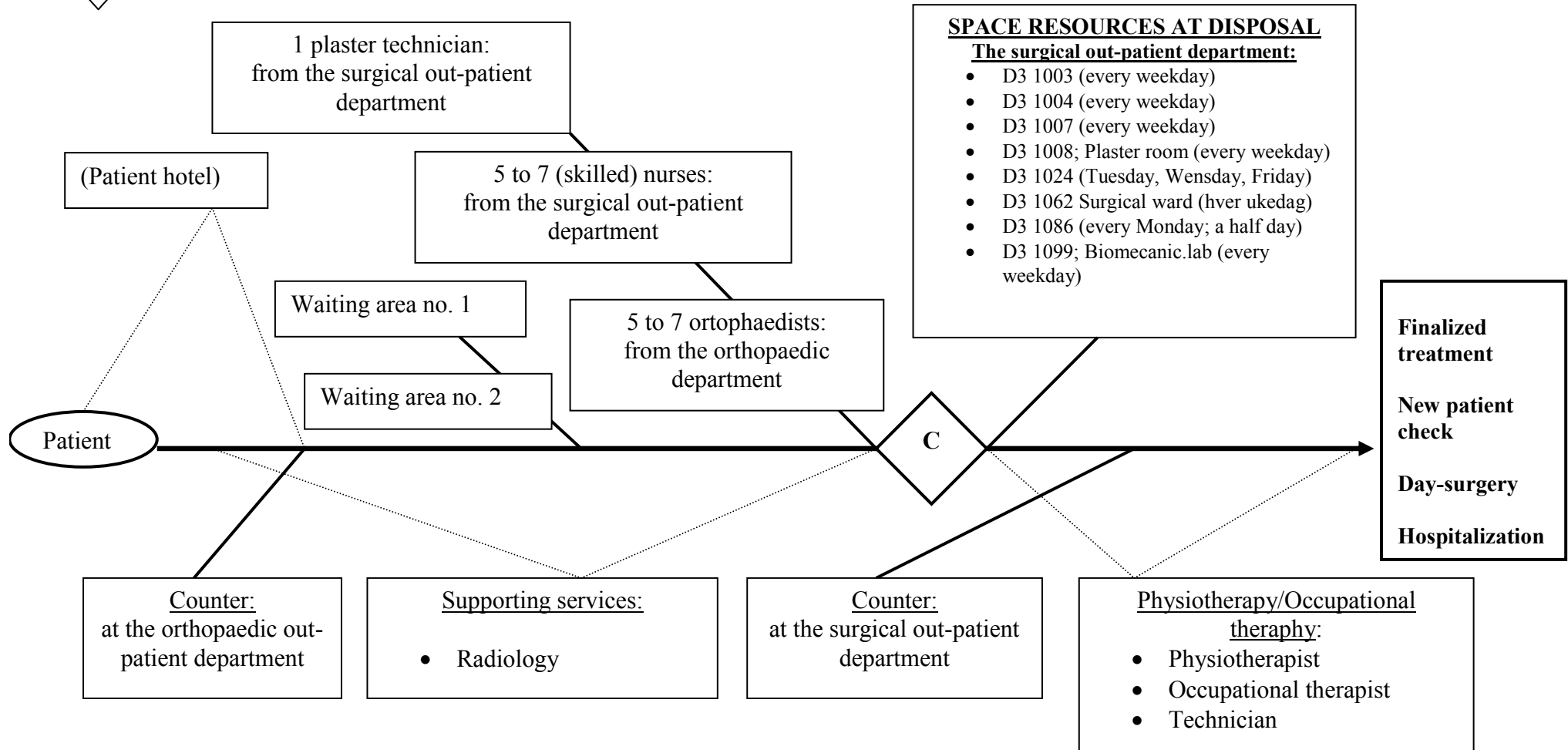




**FLOW DIAGRAM OF THE RESOURCE COORDINATION WITHIN THE ORTHOPAEDIC OUT-PATIENT CARE SERVICE**

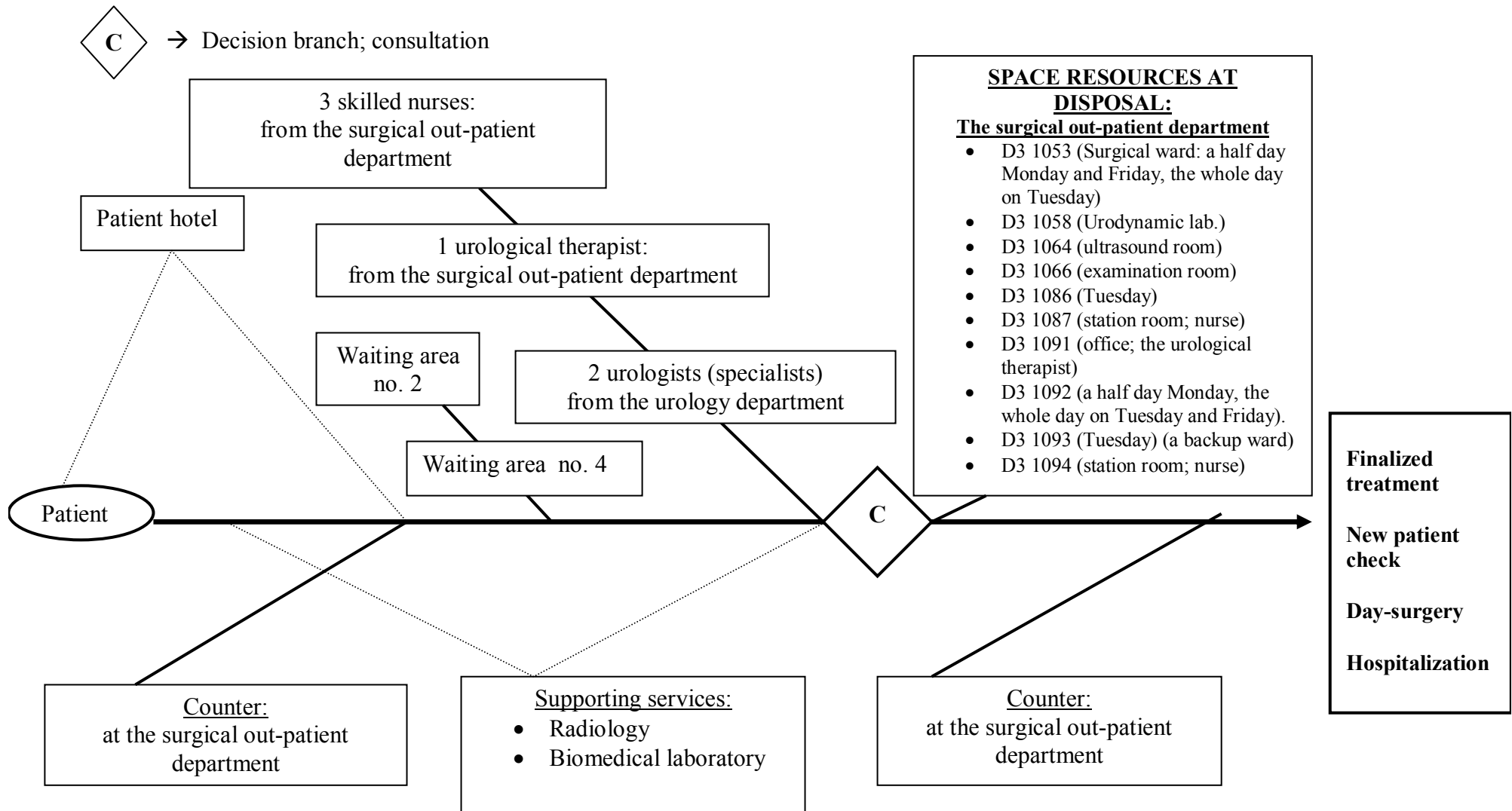


→ Decision branch; Consultation



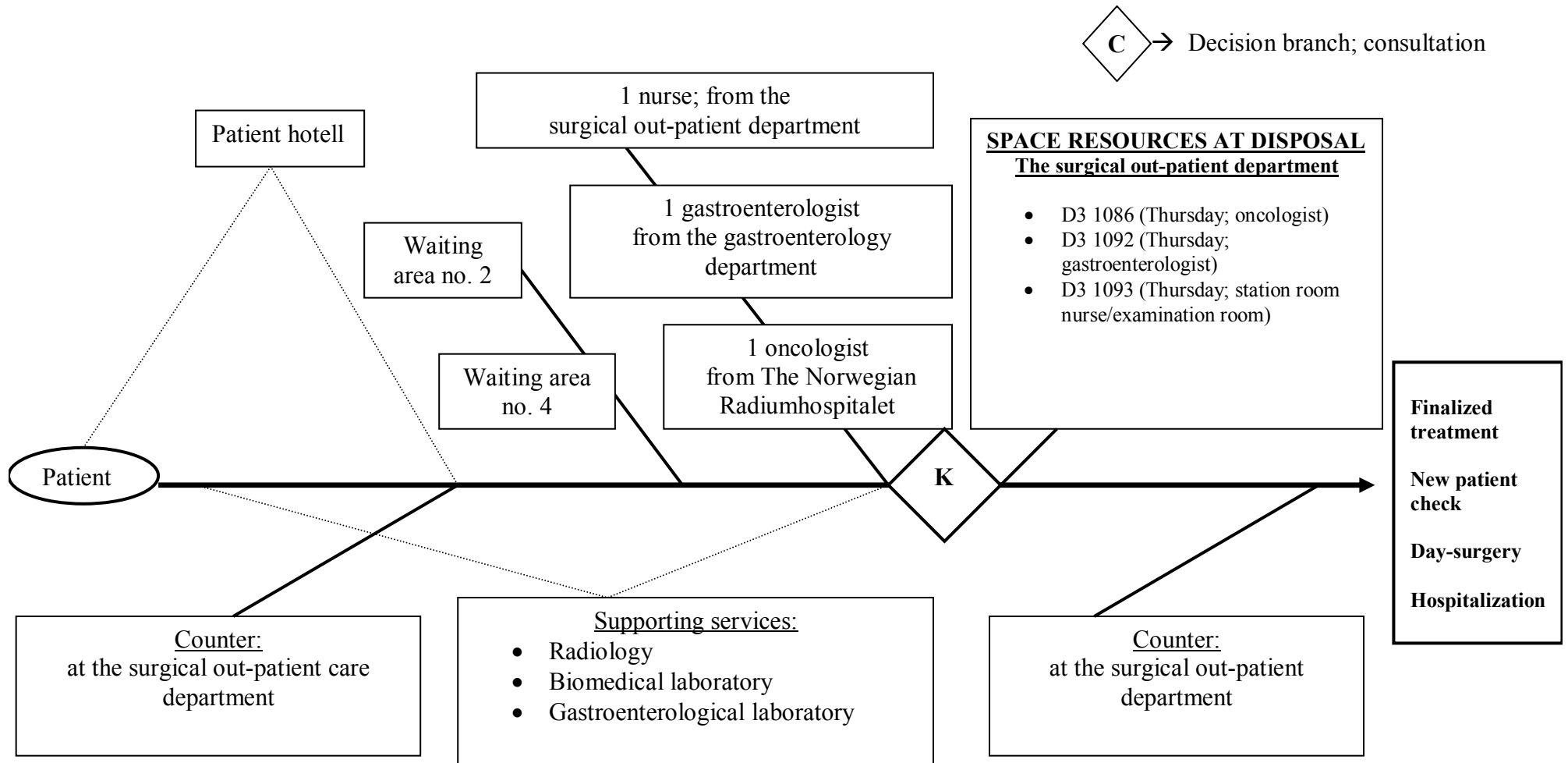
THE ORTHOPAEDIC OUT-PATIENT CARE SERVICE														
PATIENT I.D.	C/O	C/T	L/T	VIA	"WASTE" P/T	V/A Supporting services (Radiology)	V/A The out-patient service by nurse/technician	Available time in prior to core consultations	The patient's share of wait between the radiology service and the core service	The patients waiting-time in front of the core consultation	Interruption: waiting time during the core service	The total sum of waiting time for the patient	REMARKS	
1	4	16	16	12	4	1		1						
2	5	21	21	16	5	1		3						
3	5	18	49	13	36	2			31			31		LACK OF RADIOLOGICAL DESCRIPTION
4	5	34	34	27	7	2	17	1	25		2	27		THE PATIENT WAS LATE BY 29 MINUTES
5	8	25	39	17	22	1				14		14		
6	5	22	41	17	24	2	16		108	19		127		LACK OF RADIOLOGICAL DESCRIPTION
7	2	26	47	24	23	3	17	6	54	21		75		CALLED RADIOLOGY FOR DESCRIPTION
8	6	16	63	10	53	2		-7		47		47		
9	0	0	0	0	0	0	0							CANCELED
10	7	29	44	22	22	2	15	1	76	15		91		15 MINUTES LATER START THAN SCHEDULED
11	0	0	0	0	0	0	0							THE PATIENT DID NOT SHOW UP
12	8	42	42	29	13	1					5	5		
13	4	27	27	23	4	3		14						PROBLEM TO REACH THE OCCUPATIONAL THERAPY S.
14	0	0	0	0	0	0	0							THE PATIENT DID NOT SHOW UP
15	3	14	14	11	3	2		7						
16	2	20	21	11	10	2		18	3	1	7	8		
17	2	14	18	12	6	2			2	4		4		
18	5	20	20	15	5	2	45		20			20		
19	2	13	16	11	5	2	15		19	3		22		
20	0	19	24	16	8	2		20		5	3	8		
21	7	11	15	4	11	3	13	14	40	4		44		
22	6	18	18	10	8	2		11			2	2		
23	13	27	27	14	13	3	9	24	0					
24	2	16	16	13	3	2	13		70		1	71		
25	5	31	31	26	5	2	19		30			30		DELAY IN RELATION TO RADIOLOGICAL DESCRIPTION
26	5	31	31	26	5	2	10		210			210		
27	3	10	11	7	4	1				1		1		
28	2	15	30	13	17	2	6		89	15		104		15 MINUTES LATER START THAN SCHEDULED
29	4	14	43	10	33	3	9		66	29		95		
30	5	17	19	12	7	2				2		2		
31	2	10	10	7	3	1					1	1		
32	6	33	36	19	17	1				3	8	11		
33	3	12	12	8	4	3	12	10	3		1	4		
34	2	6	6	4	2	1								
35	1	7	7	6	1	1			21					
36	2	11	31	9	22	2	32		46	20		66		20 MINUTES LATER START THAN SCHEDULED
37	3	7	7	4	3	1								THE PATIENT WAS LATE BY 29 MIN.
38	4	9	17	5	12	1				8		8		
39	8	26	26	18	8	2	18		38			38		
40	4	8	8	4	4	1				7				
41	3	10	15	7	8	1				11		5		THE PATIENT WAS DELAYED BY 5 MINUTES
42	7	34	34	27	7	1								
43	1	10	10	7	3	1					2	2		AN EMERGENCY CASE
<b>SUM</b>	<b>171</b>	<b>749</b>	<b>996</b>	<b>546</b>	<b>450</b>		<b>266</b>	<b>117</b>	<b>80</b>	<b>894</b>	<b>247</b>	<b>32</b>	<b>1173</b>	
STANDARD W/T: 20 MINUTES BEFORE 12 O'CLOCK AND 30 MINUTES AFTER 12 O'CLOCK														
TIME FACTOR: MINUTES														
THE PATIENTS SHARE OF WAITING TIME BETWEEN RADIOLOGY SERVICE AND THE CORE CONSULTATION IS CORRECTED FOR PROCEDURES (V/A: NURSE/TECHNICIAN)														

**FLOW DIAGRAM OF THE RESOURCE COORDINATION WITHIN THE UROLOGY OUT-PATIENT CARE SERVICE**



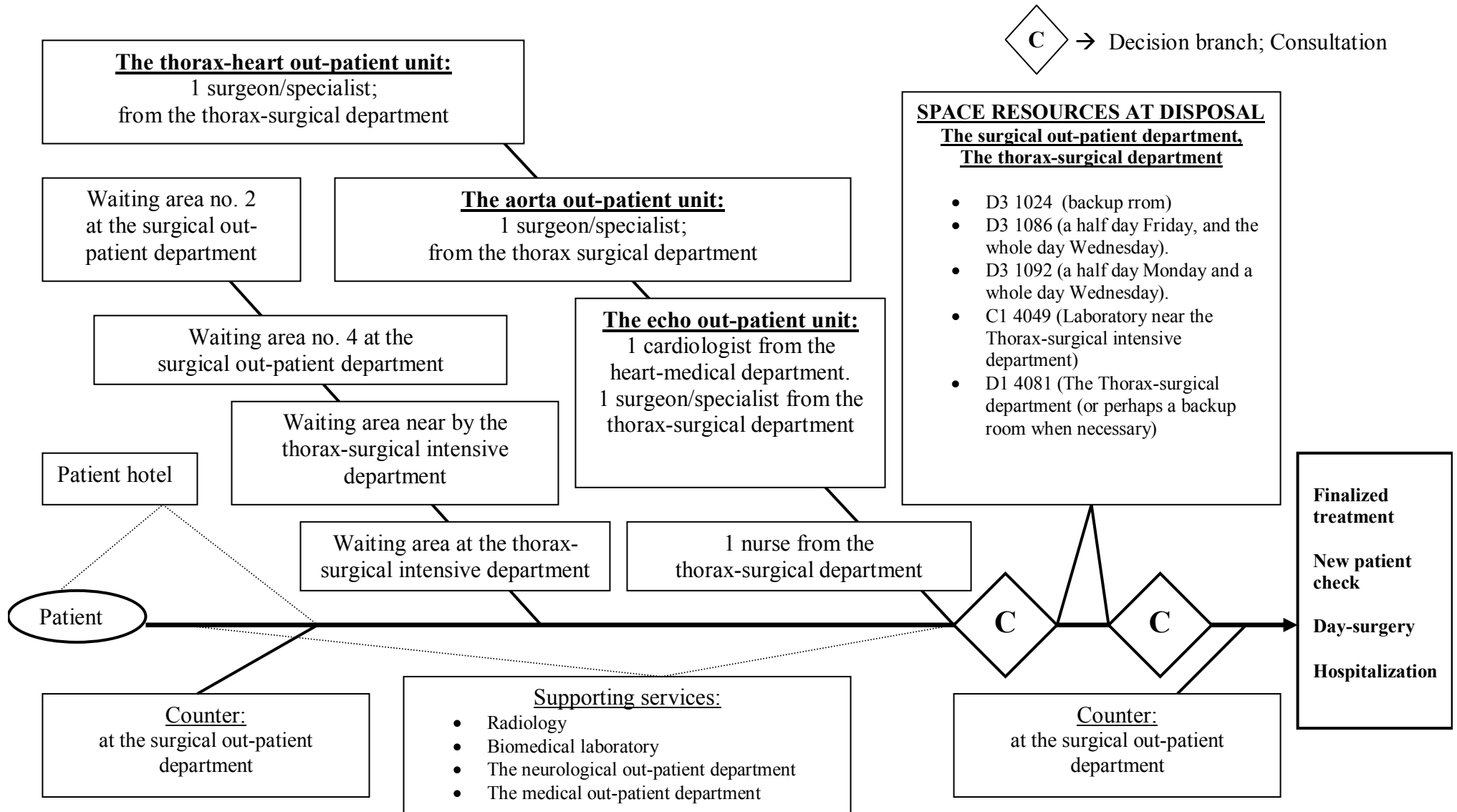
	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O
1	<b>THE UROLOGY OUT-PATIENT CARE SERVICE</b>														
2															
3	<b>PATIENT</b>	<b>C/O</b>	<b>C/T</b>	<b>L/T</b>	<b>VIA</b>	<b>WASTE</b>	<b>P/IT</b>	<b>VIA</b>	<b>The patient's</b>	<b>VIA</b>	<b>VIA</b>	<b>Available time</b>	<b>The patients waiting-</b>	<b>The total sum of</b>	<b>REMARKS</b>
4	<b>I.D.</b>							<b>The out-patient</b>	<b>waiting time be-</b>	<b>The out-patient</b>	<b>Extra assistance</b>	<b>in prior to core</b>	<b>time in front of the core</b>	<b>waiting time</b>	
5								<b>urological therap</b>	<b>service and core servic</b>	<b>the assistant nurse</b>	<b>urologist and nurse</b>	<b>consultations</b>	<b>consultation</b>	<b>for the patient</b>	
6															
7	1	0	0	0	0	0							0	0	THE PATIENT DID NOT SHOW UP
8	2	5	33	33	28	5				8			0	0	
9	3	5	34	37	29	8							3	3	
10	4	12	42	49	30	19							7	7	
11	5	4	11	30	7	23				5			19	19	
12	6	8	23	23	15	8							0	0	
13	7	2	10	33	8	25				3	50		23	23	23 MINUTES LATER START THAN SCHEDULED
14	8	6	22	73	16	57	2	45	15				51	66	
15	9	1	18	18	17	1	2				28		0	0	EMERGENCY APPOINTMENT
16	10	3	27	70	24	46	1						43	43	
17	11	7	21	61	14	47	1						40	40	
18	12	9	13	50	4	46	2				29		37	37	EXTRA APPOINTMENT
19	13	10	20	40	10	30	3			8	5		20	20	
20	14	10	25	25	15	10	1						0	0	
21	15	4	16	16	12	4	1						0	0	
22	16	7	32	35	25	10	1						3	3	REQUIRED HOTEL
23	17	14	34	39	20	19	1						5	5	
24	18	24	26	35	2	33	1			19			9	9	
25	19	0	0	0	0	0	0						0	0	THE PATIENT DID NOT SHOW UP
26	20	3	7	29	4	25	1						22	22	22 MINUTES LATER START THAN SCHEDULED
27	21	0	0	0	0	0	0					44	0	0	THE PATIENT DID NOT SHOW UP
28	22	16	23	36	7	29	2			8			13	13	
29	23	6	23	29	17	12	2						6	6	
30	24	9	21	40	12	28	1						19	19	
31	25	0	0	0	0	0	0						0	0	CANCELLED
32	26	0	0	0	0	0	0					68	0	0	THE PATIENT DID NOT SHOW UP
33	27	11	20	37	9	28	2	9	0				17	17	THE PATIENT WAS LATE BY 11 MINUTES, THE SPECIALIST BY 23 MINUTES
34	28	3	39	57	36	21	3			15			18	18	
35	29	11	33	60	22	38	3	20	36				27	63	REQUIRED HOTEL
36	30	0	44	44	44	0	4	5	180		30		0	180	REQUIRED HOTEL
37	31	14	32	32	18	14	1						0	0	
38															
39	<b>SUM</b>	<b>204</b>	<b>649</b>	<b>1031</b>	<b>445</b>	<b>586</b>		<b>79</b>	<b>231</b>	<b>66</b>	<b>142</b>	<b>112</b>	<b>382</b>	<b>613</b>	
40															
41	<b>STANDARD W/T: 30 MINUTES PER PATIENT</b>														
42	<b>TIME FACTOR: MINUTES</b>														

**FLOW DIAGRAM OF THE RESOURCE COORDINATION WITHIN THE GASTROENTEROLOGY AND THE ONCOLOGY  
OUT-PATIENT CARE SERVICE**



	A	B	C	D	E	F	G	H	I	J	K	L	M	N	
1	<b>THE GASTROENTEROLOGY OUT-PATIENT CARE SERVICE</b>														
2	<b>PATIENT</b>	<b>C/O</b>	<b>C/T</b>	<b>L/T</b>	<b>VIA</b>	<b>'WASTE' P/T</b>	<b>V/A</b>							<b>REMARKS</b>	
3	<b>I.D.</b>							The out-patient service by the assisting nurse	Available time in prior to core consultations	The patients waiting-time in front of the core consultation	Interruption: waiting time during the core service	The total sum of waiting time for the patient			
4															
5															
6	1	13	21	43	8	35	2			22		22	22 MINUTES LATER START THAN SCHEDULED. NETWORK PROBLEMS.		
7	2	9	17	30	8	22	2			13		13	SOME NETWORK PROBLEM		
8	3	15	37	48	22	26	3	11		11		11	SOME NETWORK PROBLEM		
9	4	3	45	63	42	21	3			18		18			
10	5	3	22	31	19	12	4			9		9			
11	6	4	12	45	8	37	2			33		33	33 MINUTES LATER START THAN SCHEDULED		
12	7	3	15	30	12	18	2			15		15			
13	8	1	17	17	4	13	2		28	0	12	12	LACKING EPICRISIS FROM LAST STAY AT R-R HF		
14	9	5	14	20	9	11	2			6		6			
15	10	9	35	55	26	29	2			20		20	20 MINUTES LATER START THAN SCHEDULED. NETWORK PROBLEMS		
16	11	9	20	45	10	35	3			25	1	26			
17	12	1	14	29	13	16	2			15		15			
18	13	22	34	42	11	31	2			8	1	9	SOME NETWORK PROBLEM		
19	14	0	0	0	0	0	1			0		0	THE PATIENT DID NOT SHOW UP		
20	15	3	6	101	3	98	2			95		95	THE RADIOLOGICAL NETWORK WAS OUT OF FUNCTION (PACS).		
21	16	5	24	65	19	46	1			41		41	THE RADIOLOGICAL NETWORK WAS OUT OF FUNCTION (PACS).		
22	17	15	25	60	10	50	1			35		35	THE RADIOLOGICAL NETWORK WAS OUT OF FUNCTION (PACS).		
23	18						1						THE RADIOLOGICAL NETWORK WAS OUT OF FUNCTION (PACS).		
24	19						1						THE RADIOLOGICAL NETWORK WAS OUT OF FUNCTION (PACS).		
25	20						1						THE RADIOLOGICAL NETWORK WAS OUT OF FUNCTION (PACS).		
26	<b>SUM</b>	<b>120</b>	<b>358</b>	<b>724</b>	<b>224</b>	<b>500</b>		<b>11</b>	<b>28</b>	<b>366</b>	<b>14</b>	<b>380</b>			
27	<b>STANDARD W/T:</b>		<b>30 MINUTES</b>												
28	<b>TIME FACTOR: MINUTES</b>														
29															
30	<b>THE ONCOLOGICAL OUT-PATIENT CARE SERVICE</b>														
31	<b>PASIENT</b>	<b>L/T</b>	<b>REMARKS</b>												
32	<b>ID.</b>														
33	1	56	20 minutes later start than scheduled												
34	2		The patient was delayed by approximately 60 minutes												
35	3		The patient attended with ambulance, 4 minutes delayed												
36	4	83													
37	5		The patient was trasfered to the oncological out-patient care service												
38	6	192	The patient 6 and 7 did both take part in a research project (SECA)												
39	7	162	The patient was 1 minute delayed and the oncologist 15 minutes delayed.												
40	8	151	The patient was an emergency assessment												
41		<b>644</b>													
42	<b>STANDARD W/T:</b>		<b>45 MINUTES PER PATIENT</b>												
43															

**FLOW DIAGRAM OF THE RESOURCE COORDINATION WITHIN THE THORAX-SURGICAL OUT-PATIENT DEPARTMENT**



Microsoft Excel - DataoppsummeringMaster													
	A	B	C	D	E	F	G	H	I	J	K	L	
1	<b>THE THORX-HEART OUT-PATIENT CARE SERVICE</b>												
2													
3	<b>PATIENT</b>	<b>C/O</b>	<b>C/T</b>	<b>L/T</b>	<b>V/A</b>	<b>"WASTE"</b>	<b>P/T</b>						<b>REMARKS</b>
4	<b>I.D.</b>							Available time	The patients waiting-	Interruption:	The total sum of		
5							in prior to core	time in front of the core	waiting time during	waiting time			
6							consultations	consultation	the core service	for the patient			
7	1	9	45	55	36	19	3	5	10		10	10 MINUTES LATER START THAN SCHEDULED	
8	2	7	14	128	7	121	3		114		114	THE PATIENT'S APPOINTMENTS WAS RE-BOOKED BECAUSE OF DELAYS	
9	3	0	0	0	0	0	1 ?		0		0	CANCELLED APPOINTMENT	
10	4	12	27	27	15	12	2		0		0		
11	5	10	23	30	13	17	5		7		7		
12	6	12	24	34	12	22	2		10		10		
13	7	6	14	18	8	10	3	3	4		4	4 MINUTES LATER START THAN SCHEDULED	
14	8	25	43	43	18	25	3		0		0	LACKING DESCRIPTION FROM THE NEUROLOGICAL OUT-PATIENT CARE SERVICE	
15	9	8	18	22	10	12	1		4		4		
16	10	3	13	13	10	3	3		0		0		
17	11	23	35	47	12	35	2		12		12	12 MINUTES LATER START THAN SCHEDULED	
18	12	10	27	54	12	42	3		27	5	32	LACKING DESCRIPTION OF RAODIOLOGY SERVICE	
19	13	7	26	40	19	21	2		14		14		
20	14	5	22	42	15	27	2		20	2	22		
21	15	8	15	37	7	30	2		22		22	THE PATIENT HAD MISANDERSTOOD THE INFORMATION IN RELATION TO THE CALL UP	
22	16	5	10	27	5	22	3		17		17		
23	17	14	25	44	11	33	2		19		19	19 MINUTES LATER START THAN SCHEDULED	
24	18	10	16	74	5	69	3		58	1	59	THE PATIENT DID NOT FIND THE WAY TO THE WAITING-POINT	
25	19	5	18	28	13	15	3		10		10		
26	20	15	27	90	12	78	2		63		63		
27	21	10	28	95	18	77	4		67		67	COORDINATION OF AN APPOINTMENT AT THE CARDIOLOGICAL LABORATORY WAS NOT POSSIBLE	
28	22	15	29	29	14	15	5	9	0		0		
29	23	9	38	102	29	73	3		64		64	COORDINATION OF AN APPOINTMENT AT THE CARDIOLOGICAL LABORATORY WAS NOT POSSIBLE	
30												LACKING DESCRIPTION FROM THE NEUROLOGICAL OUT-PATIENT CARE SERVICE	
31													
32	<b>SUM</b>	<b>228</b>	<b>537</b>	<b>1079</b>	<b>301</b>	<b>778</b>		<b>17</b>	<b>542</b>	<b>8</b>	<b>550</b>		
33	<b>STANDARD W/T:</b>	<b>20 MINUTES</b>											
34	<b>TIME FACTOR:</b>	<b>MINUTES</b>											



	A	B	C	D	E	F	G	H	I	J	K	L
1	<b>THE AORTA OUT-PATIENT CARE SERVICE</b>											
2												
3	<b>PATIENT</b>	<b>C/O</b>	<b>C/T</b>	<b>L/T</b>	<b>V/A</b>	<b>'WASTE' P/T</b>					<b>REMARKS</b>	
4	<b>I.D.</b>							The patients waiting- time in front of the core consultation	Interruption: waiting time during the core service	The total sum of waiting time for the patient		
5												
6												
7	<b>1</b>	<b>9</b>	<b>27</b>	<b>43</b>	<b>18</b>	<b>25</b>	<b>3</b>	<b>16</b>		<b>16</b>	<b>16 MINUTES LATER START THAN SCHEDULED</b>	
8	<b>2</b>	<b>18</b>	<b>39</b>	<b>60</b>	<b>20</b>	<b>40</b>	<b>2</b>	<b>21</b>	<b>1</b>	<b>22</b>		
9	<b>3</b>	<b>0</b>	<b>8</b>	<b>8</b>	<b>8</b>	<b>0</b>	<b>2</b>	<b>0</b>		<b>0</b>		
10	<b>4</b>	<b>19</b>	<b>41</b>	<b>41</b>	<b>22</b>	<b>19</b>	<b>2</b>	<b>0</b>		<b>0</b>		
11	<b>5</b>	<b>23</b>	<b>45</b>	<b>56</b>	<b>20</b>	<b>36</b>	<b>2</b>	<b>11</b>	<b>2</b>	<b>13</b>		
12	<b>6</b>	<b>6</b>	<b>19</b>	<b>45</b>	<b>13</b>	<b>32</b>	<b>3</b>	<b>26</b>		<b>26</b>		
13	<b>7</b>	<b>10</b>	<b>20</b>	<b>35</b>	<b>10</b>	<b>25</b>	<b>2</b>	<b>15</b>		<b>15</b>	<b>15 MINUTES LATER START THAN SCHEDULED</b>	
14	<b>8</b>	<b>19</b>	<b>39</b>	<b>54</b>	<b>20</b>	<b>34</b>	<b>4</b>	<b>15</b>		<b>15</b>		
15	<b>9</b>	<b>5</b>	<b>47</b>	<b>71</b>	<b>39</b>	<b>32</b>	<b>2</b>	<b>24</b>	<b>3</b>	<b>27</b>		
16	<b>10</b>	<b>7</b>	<b>14</b>	<b>55</b>	<b>7</b>	<b>48</b>	<b>3</b>	<b>41</b>		<b>41</b>		
17	<b>11</b>	<b>16</b>	<b>25</b>	<b>50</b>	<b>9</b>	<b>41</b>	<b>2</b>	<b>25</b>		<b>25</b>		
18	<b>12</b>	<b>11</b>	<b>24</b>	<b>44</b>	<b>13</b>	<b>31</b>	<b>2</b>	<b>20</b>		<b>20</b>		
19												
20	<b>SUM</b>	<b>143</b>	<b>348</b>	<b>562</b>	<b>199</b>	<b>363</b>		<b>214</b>	<b>6</b>	<b>220</b>		
21	<b>STANDARD W/T:</b>			<b>30 MINUTES</b>								
22	<b>TIME FACTOR: MINUTES</b>											

Microsoft Excel - DataoppsummeringMaster																
	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P
1	<b>THE ECHO OUT-PATIENT CARE SERVICE</b>															
2																
3	<b>PATIENT</b>	<b>C/O</b>	<b>C/T</b>	<b>L/T</b>	<b>VIA</b>	<b>'WASTE'</b>	<b>P/T</b>	<b>V/A</b>	<b>V/A</b>	<b>V/A</b>						<b>REMARKS</b>
4	I.D.							Time used on the echo-test (procedure)	The surgical assessment	Independent procedures by the nurse	The patient's share of wait between the echo-test and the surgical assessment (in relation to scheduled time)	The patient's waiting time in front of the echo consultation	The patients real waiting time in front of the surgical assessment	Interruption: waiting time during the core service	The total sum of waiting time for the patient	
7	<b>GROUP 1:</b>															
8	1						4									SURGICAL ASSESSMENT AT THE THORAX-SURGICAL DEPARTMENT
9	2						4									SURGICAL ASSESSMENT AT THE THORAX-SURGICAL DEPARTMENT
10	3			191			5									
11	4			126			4									
12	5			0			0									THE PATIENT DID NOT SHOW UP
13	6			205			4									
14	7			126			4									
15	8			222			4									
16																
17	<b>SUM</b>			<b>870</b>												
18	<b>GROUP 2</b>															
19	1	9	112	349	84	265	4	55	14	16	41	12	225	19	297	SURGICAL ASSESSMENT AT THE THORAX-SURGICAL DEPARTMENT
20	2	12	142	335	86	249	4	34	30	14	0	37	156	44	237	SURGICAL ASSESSMENT AT THE THORAX-SURGICAL DEPARTMENT
21	3	18	77	200	46	154	4	15	3	24	84	10	113	13	220	EMERGENCY TASKS AT THE OPERATING THEATRE; 2 X 30 MINUTES
22																TECHNICAL PROBLEMS. COMPUTER NETWORK PROBLEMS
23																SURGICAL ASSESSMENT AT THE THORAX-SURGICAL DEPARTMENT
24	4	14	58	179	43	136	4	19	6	8	33	19	102	1	155	SURGICAL ASSESSMENT AT THE THORAX-SURGICAL DEPARTMENT
25																TECHNICAL PROBLEMS. COMPUTER NETWORK PROBLEMS
26	4	30	84	206	49	157	6	14	13	21	102	7	115	5	229	SURGICAL ASSESSMENT AT THE THORAX-SURGICAL DEPARTMENT
27																THE PATIENT WAS SEND TOTHE RADIOLOGY SERVICE TWICE
28																COMPUTER NETWORK PROBLEMS
29	6	13	56	176	43	133	5	12	11	17	67	0	120	0	187	SURGICAL ASSESSMENT AT THE THORAX-SURGICAL DEPARTMENT
30																COMPUTER NETWORK PROBLEMS.
31																THE PATIENT WAS LACKING REQUISITION AT THE BIOMEDICAL LAB
32	<b>SUM</b>	<b>96</b>	<b>529</b>	<b>1445</b>	<b>351</b>	<b>1094</b>		<b>149</b>	<b>77</b>	<b>100</b>	<b>327</b>	<b>85</b>	<b>831</b>	<b>82</b>	<b>1325</b>	
33	<b>SCHEDULED W/T:</b>	<b>2 x 15 MINUTES</b>														
34	<b>TIME FACTOR: MINUTES</b>															