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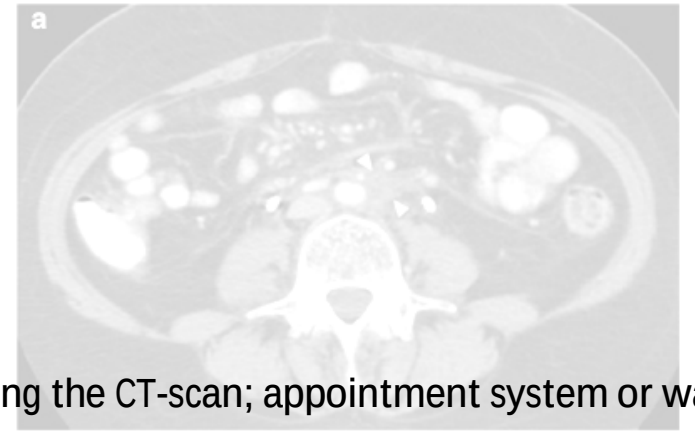
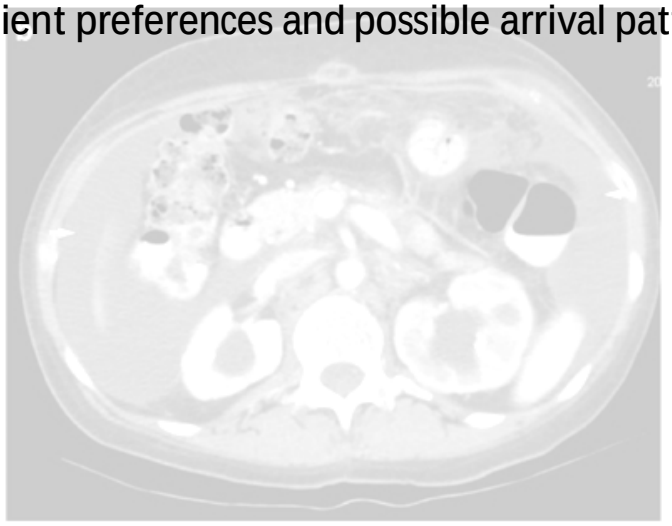


Visiting the CT-scan; appointment system or walk in?

Patient preferences and possible arrival pattern



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Visiting the CT-scan; appointment system or walk in? Patient preferences and possible arrival pattern.

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Master Thesis Health Sciences

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Preface

Improving quality is an important aspect of healthcare these days. The background of this study is to improve access on a radiology department. This study in particular focuses on the preferences of patients who are needing a CT scan. It took place from January 2009 until July 2009 at the Academic Medical Center in Amsterdam.

Investigating preferences of patients was rather new for me but appeared to be very interesting. Especially having contact with the patients proved to be very appealing. Many patients were very open and liked to tell me everything about their experiences in the AMC and (much) more.

Although it was sometimes a struggle to finish this thesis, I am very glad I took the opportunity of going to an Academic hospital. Therefore I would like to thank the department KPI of the AMC, especially the logistic division for always being interested in my work. I also would like to thank Ir. Jasper van Sambeek for his ideas and suggestions. Also a word of thanks goes to Jelmer Kranenburg who executed an other part of the study in the AMC. It was very nice to share ideas with an other student. From the University of Twente I would like to thank Dr. Marjan Hummel and Dr. Janine van Til for their feedback at my thesis and enthusiasm about this study. It provided me inspiration to go on.

I hope this study will contribute to an access system at the CT scan which will improve the quality and match better with the preferences of the patients.

Emmeloord, August 2009

Mariska Scholtens

Executive Summary

More and more countries face the challenge of improving quality of healthcare. Many problems like long waiting times are threatening quality standards. Access to healthcare is important to create timely care, which is an aim of improving quality according to the IOM (2001). Different systems that can improve access are described in literature. The new introduced systems are supposed to be patient centered, but which aspect of access systems is preferred most by patient's remains unclear.

The radiology department is a supporting department which uses diagnostic technologies. Many patients are referred to radiology so it has to deal with many (patient)flows. Because it is many times a bottleneck in patient flows, problems like long waiting times occur. Especially improvements to this department can contribute to higher quality. Therefore a good working access system is an important tool to reach improvement in quality like more timely and patient centered care. In the Academic Medical Center Amsterdam at the CT scan, a diagnostic technology at radiology, they use only bookable appointments in advance; an appointment system. An other possibility is a walk in system; in this system patients can walk in whenever they like, without an appointment.

When changing from an appointment system to a walk in system different service aspects can change; the access time, the waiting time, the possibility of 'one stop shop' and the autonomy in choice of moment. The access time will reduce to zero days and one stop shop is a possibility of walk in. Patients can choose their own moment but when patients all come at the same moment waiting time in the waiting room might rise. This study explored the priorities of those service aspects and possible arrival patterns when a walk in system might be implemented.

With a multi criteria method, an Analytic Hierarchy Process, the priorities of the service aspects are measured. The AHP was integrated in a questionnaire. Via the questionnaire, together with analysing databases of the case hospital, possible arrival patterns were constructed.

One stop shop has been prioritised as most valuable by the respondents. Many patients have to travel for over thirty minutes, so they would like to minimize their hospital visits when possible. Next are, in order of priority, short access time, short waiting time and autonomy in choice of moment. Short access time is important because patients want to get it over with as soon as possible; in many cases the results are important to know because of their treatment. Short waiting time ranks third; this does not mean it is not important for the patients, but in most of the cases patients already have to wait a long time because of the preparation of the scan. Last is autonomy in choice of moment. When patients can choose between

making the choice themselves or the hospital makes the choice they choose the first option, but the patients value it as least important compared to the other service aspects.

With the scores of the AHP different scenarios were calculated. These scores showed that the current system ranks not very high based on patient preferences. Best improvements could be made with every scenario with 'no access time' and 'CT scan and outpatient appointment on the same day'. Those scenarios scored best, compared to the current appointment system.

To explore the possible arrival patterns there were two main options; patients obtaining one stop shop and patients who do not. The first arrival pattern is based on the consulting hours of the outpatient department. This resulted in peak moments at 11.30, 12.00 and 14.30, but also moments when almost no patients would arrive. These peak moments almost occur at the same moments when patients choose their own favourite moment; normal weak days (Monday till Thursday) between 09.00 and 15.00. Patients might come on other moment when they have information about busy moments; this can be provided by the physician or by the internet.

If hospitals consider patient centeredness as important they should consider a walk in system. Overall a walk in system would match better with the preferences of the patients than the current appointment system, but to be sure implementing a new system is going to be a success further research is necessary to create support for it. It might be preferred by the patients, but the staff at the radiology department has to work with it. A more flexible work situation will be the result; but if that is reached a walk in system is a realistic option.

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1 Introduction

More and more countries face the challenge of improving quality of healthcare. Too many problems with timely, patient centered and efficient care are threatening quality standards. Long waiting times for patients is one of the problematic results.

Improving access to healthcare is important to solve those problems and to create timely care as well as patient centered and efficient care. Different systems that can improve access to avoid long waiting times and dissatisfied patients are described in literature. The new introduced systems are supposed to be patient centered, but which aspect of access systems is preferred most by patient's remains unclear.

In many hospitals the radiology department with several diagnostic technologies causes troubles in patient flows by which among others long waiting times occur. Many patients are referred to it and are going back to their referring physician with the results. Therefore a good working access system is especially important at a department like radiology. This study will focus on the preferences and intended behaviour of patient's regarding access to the CT scan, a diagnostic technology.

This first chapter will be introductory. Paragraph 1.1 describes a short introduction to the subject. Paragraph 1.2 and 1.3 will give more background information based on previous studies.

1.1 Quality of health care

According to the Institute of Medicine (IOM) a fundamental change is needed in the health care system of the United States of America. In their report 'Crossing the quality chasm' (2001) they say there is a chasm between the actual situation and the desired situation in case of the delivered quality. Six different aims are proposed by the committee to improve the health care;

- Safe: Intended care should avoid injuries.
- Effective: Provided care should be evidence based and under and overuse should be avoided. Differences in the delivered care can only be due to differences in the patients, they cannot be due to the preferences of care professionals.
- Patient centered: The patient has to be in the centre of all organized services.
- Timely: Reducing waste and sometimes harmful delays for the receivers of care and those who provide care.
- Efficient: Avoiding waste, supplies, ideas and energy.
- Equitable: The quality of the provided care does not vary because of personal characteristics or socio-economic status.

The report of the IOM is applicable for most Western countries. Those countries are also facing the challenge to improve the overall quality they deliver on multiple dimensions (Berg et al., 2005). Patients are more and more seen as consumers of health with their own demands. The Dutch government introduced competition in the health care sector to stimulate a demand driven market where hospitals deliver care with the highest quality for the lowest costs. The tendency to create more patient centered and efficient care in hospitals in the Netherlands is an important issue, but the aim of patient centered care do not always agree with efficient care. This can be problematic for hospitals because it is very difficult to accomplish all aims of improving quality.

1.2 Access systems

Improving access to healthcare is one of the key issues of improving quality, patient choice and participation (Rogers et al., 2004). Access systems vary from each other from completely open (non bookable appointments in advance) to only bookable appointments or a combination of those. Although there is no widespread agreement about the dimensions of patient satisfaction, 'access' is seen as one of them (Parente et al., 2005). According to Goldstein et al. (2000) access includes 'physical location, hours of operation, telephone access, appointment waiting time (access time) and time in waiting room' (p. 855).

A more traditional way of scheduling patients is by using an appointment system. In this system all appointments are booked in advance. A possible advantage for the physician is that the workload is more spread over the day and week. For the patient an advantage could be that they can plan their visit with their other commitments and that the waiting time in the waiting room is easier to control because an appointment is scheduled at a certain time (Arber & Sawyer, 1982). Disadvantages might be longer access times for the patients and in some health care organisations having no choice of appointment day and time.

The Institute of Medicine cited in 'Crossing the Quality Chasm' that advanced access systems like open access can improve patient centered care and efficiency (IOM, 2001). In this system no bookable appointments in advance are made. This scheduling system is pointed out as an acceptable and promising method, although it is still in a developmental stage (Forjuoh et al., 2001). It is a patient centered approach of giving access to a service because it allows patients to choose and control when they want to go to the hospital to make a scan so they can obtain same-day appointments (one-stop-shop) (Kennedy & Hsu, 2003). Next to these possible advantages also short access times might be positive for the patient. Disadvantages for the doctor might be the change in patient flow which might be unequally spread over the day and possibly a higher referral rate because referring doctors might think the 'patient can be seen immediately' (Dunnill & Pounder, 2004). The change in patient flow can also affect the patient's situation

itself. Because peak moment might occur the waiting time in the waiting room might be very high at certain moments.

Most 'open access' systems described in literature are focused on primary care, especially on the general practitioner. Open access means most of the time that the vast majority of appointments is left open and unscheduled until the day they are used (Kennedy & Hsu, 2003). At that day patients can call to make an appointment for that particular day. Motto is 'doing today's work today' (Kennedy & Hsu, 2003). It is also known as 'Advanced Access'. 'Open' can also mean 'sit and wait', like in open surgeries at the GP. In some organisations a combination of these access systems is also possible, like when patients wishes are respected; some patients like appointments, others like to walk in whenever they want (Allen et al., 1988; Rogers et al., 2004).

1.3 Preferences

Patients can contribute to the improvement of health care. Because they participate in healthcare delivery it is important to know which aspects they think are important and less important. This can be used by health care providers to prioritise their efforts to create more patient centered health care. The priorities of patients are 'normative expectations; ideas about what should or ought to happen' (Thompson & Sunol, 1995 in Wensing et al., 1998, p 1573).

Next to the usage of access systems there are also studies about the preferences of patients regarding access systems and its service aspects. The expectations of patients are high regarding access to health care (Bower et al., 2003). Pacoe et al. (2004) concludes that the selection for the type of appointment (bookable vs. non bookable) of patients depends on their own preferences or needs at that time.

Allen et al. (1988) describe in their study about patient satisfaction at general practitioners that 60 percent of appointment system users prefer an appointment system above an open access system. With open access system users this is much higher; 90% of the users prefer an open access system. After further analysing the data they conclude that the preferences of the access systems were related to the time they had been waiting. 69% who had waited less than 15 minutes before surgery preferred an appointment system. This percentage dropped till 45% when the patients had to wait more than 30 minutes. They also found evidence that there were shorter waiting times with the use of an appointment system and longer waiting times with open access. This corresponds with earlier studies (Allen et al., 1988). Also Arber & Sawyer (1982) have the same conclusion; patients at GP clinics without an appointment system had to wait twice as long as patients at general practice with an appointment system. According to Lacy et al. (2004) patients might spend increasing amounts of time waiting in the waiting

room with open access which can cause feelings of disrespect. This can be reduced when open access clinic staff explain in a very clearly way that the patients can be seen this day but that they might have to wait for while.

Waiting time (in the waiting room and till the appointment (access time)) is seen a one of the most important aspects of patient dissatisfaction and complaints. In a qualitative study of Lacy et al. (2004) some patients see waiting even as a communication of disrespect; 'patients wait to get an appointment time, the patients wait in the waiting room, and the patients wait in the examination room' (p 543). In a study of Huang (1994 in Dunnill & Pounder, 2004) patients were happy to wait 37 minutes when they arrived on time. When they were late they wanted to wait no more than 63 minutes but when they arrived more than 15 minutes early they expected to be seen early. These numbers are long when compared with other studies like Bower et al. (2003). In that study the satisfactory standard of waiting for GP was 6-10 minutes for consultation to begin. Differences might be there because of the different health care services (GP, outpatient department).

One survey in a gastroenterology clinic reported that patients placed a similar value on long waits for an outpatient appointment as on waiting times for investigation in a waiting room (Moayyedi et al., 2002). So waiting in general is an important source of dissatisfaction. Although speed of access is important, patients do not seem to want fast access at all costs. Instead of fast access at all costs they value a more complex mix of factors (Gerard et al., 2008). In that same study of Gerard et al. (2008) patients traded off speed of access for more convenient appointment times. This is also the conclusion of Rubin et al. (2006) and Salisbury et al. (2007). They say that 'the top priority for patients was to be seen on a day of choice rather than to be seen quickly' (Salisbury et al., 2007 p. 615).

Increasing patient choice is seen as desirable; choice in treatment options but also in flexibility of appointments. Cartwright et al. (1990) explored the preferences of patients for different appointment times for their GP. They conclude that morning and afternoon surgeries meet preferences of most patients but patients who are employed preferred appointments during their free time. Also late evening and weekend surgeries were seen as desirable. Murray (2003) also reported that most people would like to have their appointments between 9 AM and 5 PM although there is a younger, employed, group who is interested in evening appointments. The survey concludes that one quarter (n=450) would prefer evening appointments but only 1% of the patients tried to change their appointment, so there was no effectively demand.

Preferences differ by different patient groups (Salisbury et al., 2007). Most important groups regarding access systems are divided by gender, age and (un)employment (Gerard et al., 2008, Rubin et al.,

2006). Access systems should be flexible to meet the needs of the different patients (Salisbury et al., 2007). Working patients prefer the convenience of day and time of their choice (Salisbury et al., 2007 ; Rubin et al., 2006). In the study of Rubin et al. (2006) employed patients thought that choice of time was six times more important than a shorter access time. They were even willing to wait one day extra for this. According to Rubin et al. also younger patients preferred being seen on a particular time. Older patients would like to make an appointment in advance. But all groups prefer a day of their own choice. The assumption that patients follow their preferences in practice might be made, but that it is an assumption reported Salisbury et al. (2007). Patients in advanced access practices were no more or less likely to obtain an appointment that matched their priorities than those in control practices (Salisbury et al., 2007).

2 Problem description

This second chapter will describe the essence of the problem of this particular study. Paragraph 2.1 shows the research questions which will be used as a guide for this research. 2.2 will give some of the expectations of the results and this chapter will finish with the scientific importance in paragraph 2.3.

2.1 Appointment or walk in

The radiology department in a hospital is a supporting department. Many patients are referred to radiology so it is an important step in patient flows, which often results in delays for patients. In the Academic Medical Center (AMC) in Amsterdam they are using in case of the CT scan only bookable appointments in advance, which is called an appointment system. An other possibility is an open access or walk in system; in this system no bookable appointments can be made in advance. Different aspects regarding access systems are important for patients like waiting times, access times and choice (Rogers et al., 2004; Schattner et al., 2006; Lacy et al., 2004, Rubin et al., 2006, Salisbury et al., 2007). The switch from one system to the other can change different aspects for patients that can influence their satisfaction. When a hospital changes from appointment to a walk in system no access times are present anymore. Because of the absence of access times the patients can choose when they want to go. It will be possible to go right after the appointment at the outpatient department which will reduce the number of visits to the hospital. To have a choice also increases the autonomy of patients so they can schedule their hospital visit with their everyday routines (Rogers et al., 2004). Although the advantages it might be possible that patients have to wait longer in the waiting room when a lot of patients decide to come at the same moment because it is likely to assume that with a walk in system the patient flow will be unequally spread over the day. This arrival behaviour of patients will influence the utilization rate and therefore the efficiency of using the CT scan.

Many patients in the AMC need a CT scan. In 2008 9258 outpatients visited the CT scan at the Radiology department in the AMC. Next to this the CT scan is a very capital intensive machine. Most hospitals work with an appointment system to manage those cost aspects and the efficiency although this might limit patient preferences. It is important for hospitals to keep improving constantly. To do this they make a lot of assumptions about what they think is working and important. This research is interesting because there is no research available yet about a part of those assumptions, like patient preferences and intended behaviour at CT scans regarding walk in.

This study is part of a research to see what the effects of a switch from an appointment system to a completely walk in system will be. One part will be a simulation to measure the efficiency of both systems. The other part (this study) will explore the preferences of the patients and possible arrival patterns when

using a walk in system. Because of the many different meanings of open access we will use in this study the term 'Walk in'. 'Walk in' will mean completely open; in other words 'sit and wait'. No appointments can be made in advance or on the day itself.

Because there is no urgent problem on the radiology department with the CT scan, it will be a theoretical study. The department can choose if they want to use the results or not. Although it might not be used in the AMC it is possible that it will be useful for other hospitals or even other departments.

2.2 Research questions

The first main question deals with different service aspects. Service aspects are in this study facets of access systems which are important for the service of care. The service aspects chosen in this study are important when comparing two access systems at the CT scan; appointment and walk in. The service aspects used are; access time, waiting time, choice of moment and one-stop-shop (same day 'appointments'). These aspects are selected because they are influenced by the used access system and differ in case of appointment and walk in. The second question will discover the arrival patterns of the patients in two different cases; what would be the arrival pattern when patients can choose their moment when they are at home? and what would be the arrival pattern when patients directly come from the outpatient department and obtain one stop shop? This information is going to be used in the other study to simulate the access systems on efficiency. The arrival pattern is necessary to know because we expect peak moments which will influence the efficiency which in his turn can possibly reduce. When it is clear when patients come to the radiology department, it might be possible to influence them to come at a less busy moment to optimize the utilization rate.

The following research questions are formulated;

1. Which service aspects regarding access systems are preferred by patients when visiting the hospital for a CT scan?

1.1 What is the order of priority of the chosen service aspects (access time, waiting time, choice of moment and one-stop-shop)?

1.2 What are the acceptable norms of the service aspects waiting time and access time?

1.3 How well does the walk in system match with the preferences of the patients?

2. What would be the arrival pattern when using a walk in system?

2.1 What would be the arrival pattern when patients get the advice of a CT scan at home?

2.2 What would be the arrival pattern when patients get the advice of a CT scan at the outpatient department?

2.3 In which way is it possible to stimulate patients to spread their arrival times?

2.3 Expectations

Part of the questions is based on assumptions that will be tested in this study. Before the study is executed there are some expectations about the results. One of the expectation is that short waiting in general (in the waiting room and as access time) is very important for patients. We think this is true for all different patient groups. Choice of moment might be important for some groups like employed patients but the expectation is that short access time will get top priority.

Because waiting is seen as very important we expect that patients would like to wait less long when having an appointment compared to the maximum amount of time they would like to wait when having no appointment. When patients do not have an appointment, they do not exactly know when it is their turn, so they know it might take longer. Therefore, we will expect that a walk in system meets more of the patients' preferences than an appointment system. To find out if this is true questions 1.1 – 1.3 have to give an answer to this.

Patients who have a paid job are in general less flexible when it comes to making appointments; the expectation is therefore that some of them prefer a CT scan in the evening or weekend. This will be answered by question 2.1 and 2.2. With question 2.3 we will expect that patients are willing to come on other moments but they simply have to know what the busy moments are. So communication might be an important influencing tool.

2.4 Scientific importance

Many studies have been conducted to explore patient preferences. In case of access (systems) to health care these studies are scarcer but still present, especially about new patient centered approaches like walk in. Most studies are focused on primary care because walk in is most of the times implemented at for example a general practitioner. A walk in system at the CT scan is not commonly used yet. There is no literature available about it, so if a system like walk in really improves patient centred care and patient satisfaction at a radiology department in combination with efficiency is unknown. With this study it is possible to fill up this gap.

When walk in meets the wishes of the patients and it appears to be efficient after simulation, it might be usable in the AMC and other hospitals. Not only at the CT scan, but also at other scans of the radiology department. It might be useful for MRI, or even for other departments like the casting room. It also might be applicable for consulting hours of outpatient departments.

3 Research setting

This research took place in the AMC in Amsterdam. This chapter will generally describe this hospital and research setting at the CT scan.

3.1 Academic Medical Center Amsterdam

Hospital care includes medical special help and nursing care if that will follow from the treatment. Hospitals are focused primarily on curing patients. In the Netherlands there are general, academic, categorical, top clinical and trauma hospitals and independent treatment centres (RIVM, 2009).

This study takes place on the radiology department of the Academic Medical Center in Amsterdam. It is located in the area Amsterdam Zuid Oost. Academic hospitals also take care of regular patient care, top clinical care and education for medical specialists, just like general hospitals. Next to these tasks they have a top referent function, they execute scientific research and provide education for the medical faculty and they develop new medical technology and treatment options (RIVM, 2009).

The AMC is an Academic hospital with 1002 beds. Over 25.000 patients are admitted every year, almost 30.000 patients are treated in one day and over 355.000 patients are visiting the outpatient clinic (AMC, 2009).

3.2 Radiology

The radiology department of the AMC uses medical imaging technologies to diagnose patients. They have all technologies available that uses x-ray, ultrasound and magnetic resonance. Most common techniques in patient care are x-ray examinations, ultrasounds, computed tomography scans (CT scans) and magnetic resonance imaging scans (MRI scans). Also therapeutic interventions on the vascular system and abdomen are carried out on the radiology department through intervention radiology. The department is also active in doing scientifically research and giving education (AMC, 2007).

3.3 CT scan

One of the imaging techniques is the computed tomography scan. It is a research method of the human body which uses x-ray. The x-ray measures the permeability of the body in different slices from different angles. It differs how many x-rays are coming thru the body because of the different tissues a human has. A computer will count how many x-rays are coming out at every position of the body. From these measurements images will be created which will be visible at a computer screen. The images look like slices of the body. Sometimes it is necessary to use contrast to improve the quality of the images by

drinking water or special contrast or to get contrast in the blood circulation by an IV. CT scans are used to make images of the whole body; from limbs like feet till the brain or abdomen. With a CT scan it is possible to track defects in blood vessels, tumors, broken bones or cerebral infarcts (Gezondheidsnet, 2009). Because the AMC is an academic hospital, the patient population is more complex than in general hospitals because of their other functions. More complex and severe patients are helped so many CT scans might be more intensive for the patients. Going to an academic hospital might also create other expectations of the patients for example more advanced knowledge or longer waiting times.

Radiology is a supporting department. No patients are admitted at this department but patients come when they got a referral from a physician. Patients come from clinical and outpatient departments. When a patient needs a CT scan he is referred to radiology for an appointment. After the CT scan the patient has to go back to the referring physician with for the results of the scan. Because the patient and the physician have to wait till the scan is made and the results are available it is many times an important bottleneck in patient flows. Therefore it is interesting for hospitals to optimize these kind of flows. One possibility is to improve access for patients.

Patient oriented logistics can be useful in improving patient flows and is an important strategic objective of the AMC (AMC a, 2009). Those impulses of more patient oriented logistics are caused by different aspects. First the patient desires that their time is used as careful as possible. Insurance companies are demanding these days more efficiency of the health care organizations and also the professionals would like to be efficient with time and resources. Another very important strategic objective of the AMC is that all services have to be organized around the patient; patient centered care (AMC a, 2009). Both aspects, patient centered care and efficiency, are proposed to improve the quality of care. Only improved efficiency does not automatically means improved patient care and the other way around.

4 Data collection

In this chapter the methods of data collection of this study are described. The first paragraphs explain the way the data is collected in case of the different subjects of the research questions. Paragraph 4.4 will follow with the in and exclusion criteria of the respondents. The last paragraph describes how the data is analysed. In the next chapter the design of the questionnaire is described, which is also a part of the data collection.

Different ways of collecting data are used to give answers to the research questions. A flow chart gives a simplistic overview of the steps that are taken during the process (figure 4.1).

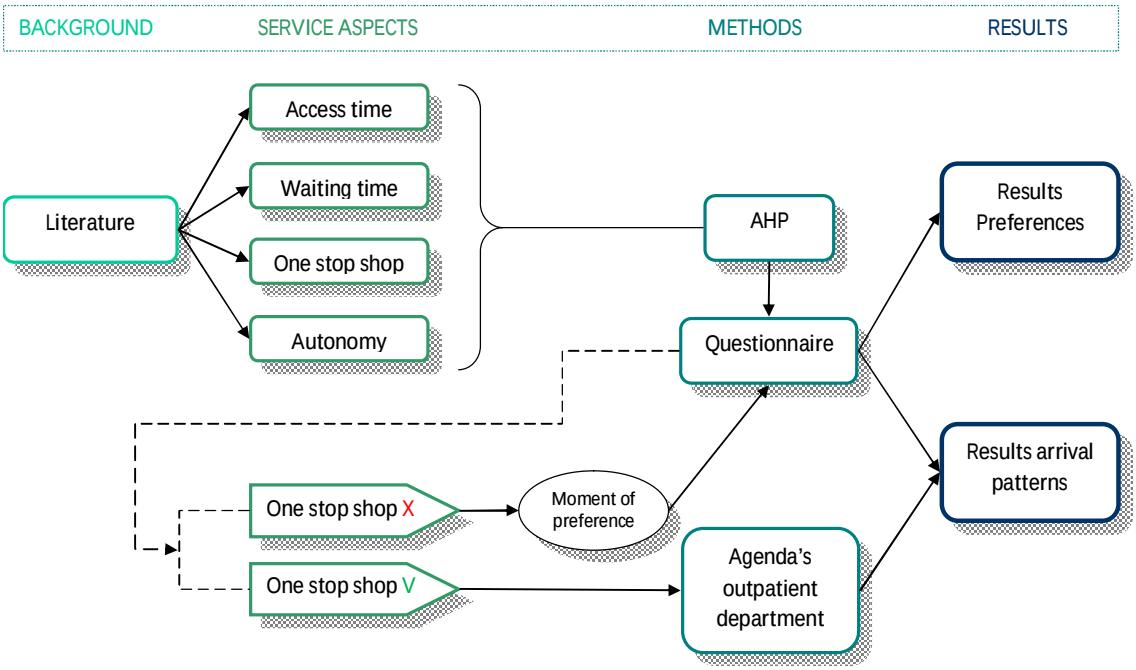


Figure 4.1; Flowchart data collection

4.1 Data collection preferences

To answer research question 1. and 1.1 a literature study is performed to see whether there is information available about service aspects and patient preferences regarding access systems. The results are described in the first chapter. The results give a picture of the important service aspects in the case of different access systems. A more extensive description of this part of the data collection can be found in chapter 10, appendix I.

The preferences and the priority of the service aspects are tested with a multi criteria analysis, included in the survey. Those methods of analyses are developed to help people make better decisions

that are consistent with their values and preferences (Dolan, 2008). The method that is used to explore this is the Analytic Hierarchy Process (AHP) integrated in a survey. This method is described extensively in the next chapter. With these results an answer on question 1.3 can be given. To answer question 1.2 different questions are included in an other part of the survey. This will be described in chapter 5.

4.2 Data collection arrival pattern

There are different possible arrival patterns because the pattern depends on what the patient wants and on the moment they hear they need a CT scan. If all patients would like to go right after their outpatient department appointment they need to be referred at that appointment because if they hear it at home it is not possible anymore to obtain a 'one stop shop'. With 'one stop shop' is meant that the patient will have more than one appointment or examination on the same day, when normally it is necessary to come back on an other day with an appointment. To find out if patients prefer one stop shop, it is used as service aspect in the AHP method and specific questions are included in the questionnaire.

The research questions 2.1 and 2.2 (what will be the arrival pattern when patients get the referral at home or at the outpatient department appointment?) are two different scenarios which are both explored. To discover at which moments patients hear they need a CT scan different outpatient departments are asked about the current situation. To explore when patients would walk in when they make use of one-stop-shop when they get the referral at the outpatient department, databases from the AMC are used. The AMC has different databases (Appointments, agenda's, all pictures made at radiology) which gave answer to this question. We evaluated the agenda's of the eight most referring specialties. All consulting hours of referring outpatient departments were extracted from a database of the AMC. Included were all consulting hours, also from non referring consults. To separate them from the referring consults the specialties that represent more than 80% of all outpatient referrals to the CT scan were asked to check off all non referring consults. To calculate the amount of referrals we made use of a specialty-based reference ratio which was based on the amount of CT scan applications of that specialty divided by the total number of patients seen on each outpatient department. To get a total picture the 80% of outpatient departments was expanded till 100%. With this average and a delay of 30 minutes (for the patient to walk to the radiology department) an arrival pattern could be constructed.

To find out when patients would like to walk in if they get the referral from their physician at home, the survey is used. This part of the survey explores the favourite days and moments to walk in.

4.3 Interview

To get a general picture of the department of Radiology and about the current situation an interview with two specialised laboratory assistants was held. The interview questions were combined with the

simulation study to see whether a walk in system is efficient and a relevant option for the AMC. The questions were mainly based to explore the current process (Appendix II). Also questions about patients complaints (are there many complaining patients?), patient no-shows (is there a high no-show rate? Why are patient not showing up?) and waiting times (Are waiting times comparable with the MRI, which is tested before?) were asked. The professionals who were interviewed are working at the radiology department in the AMC. They know much about the situation at this time, how this access system is working, if there are many complaints of the patients and if the no-show rates are high. The collected information was helpful to make a good comparison between the current access system and a possible new one. Because the questionnaire was handed out in the waiting room, a lot of conversations with patients followed. These were informal conversations but with interesting information about patients opinions. This information was not used in the AHP hierarchy or questionnaire but was taken into account when drawing conclusions.

4.4 Research population

The research population existed of outpatients from different departments. Those patients are normally less urgent and are getting an appointment in the present situation. When using a walk in system they can choose when they want to have a CT scan. Inpatients do not have the same 'choice' as outpatients when needing a CT scan because they are already in the hospital. At the time they need a scan they cannot wait as long as outpatients so they need it as soon as possible. According to the data (January 2008 – December 2008) from the appointment system (X-care) of the CT scan, most outpatients came from the General Internal Medicine. Second are Surgery and ENT (Ear, Nose and Throat) medicine.

Not all kinds of CT scans can change to walk in. Some need to be scheduled because an external physician (from another department than Radiology) need to be present. This is the case with CT's of the hart; a cardiologist need to be in the room. Also patients who need anaesthetics might need to be scheduled. Those patients were not excluded from the survey because even if they still need an appointment they might have other opinions although they might agree with an appointment because of the complexity of the CT scan. With the survey a representative group is needed so a mixed group of kinds of CT scans is asked to participate; from simple to more complex procedures.

Exclusion criteria were physically or mentally not able to fill in the questionnaire and not speaking Dutch at an appropriate level. Children were included, but the parents or supervisors helped them to fill in the questions.

4.5 Analysis

To analyse the survey questions, SPSS is used to calculate statistics. The AHP part of the survey is analysed with the use of a software programme called Team Expert Choice in combination with Microsoft Office Excel. Expert Choice uses an eigenvector method to calculate the different preferences and their priorities and is further described in the following chapter.

5 Design of questionnaire

'The beauty of the AHP technique is that the execution is simple and intuitive' *(Kendrick & Saaty, 2007 p.24)*

5.1 Questionnaire

The research questions 1.2 (acceptable norms of waiting and access time), 2.2 (arrival pattern when patients are at home) and 2.3 (how is it possible to influence patients to come on an other moment) are answered by using a survey to question patients (Appendix III). The survey was handed out in the waiting area of the CT scan and MRI in the AMC after the patient checked in at the desk. In the waiting room the patients have to wait before getting the CT scan. Because the patients come to the hospital it was a good opportunity to obtain the necessary data. All the patients filled in their questionnaire in the waiting room. Sometime with a little stop in between because they were called to get an I.V. (intra-venous), contrast or the scan. Most patients were willing to finish the survey after that break. The survey was spread in 5 working days in May 2009. April was used for piloting the questionnaire. Nine patients tested the questionnaire. For the actual survey 106 patients participated (86%). Non response was 12 (14%). Reasons for not willing to participate differed from 'forgot my reading glasses', 'not feeling well' till 'I do not like filling in a survey right now'. Everyone got the same questionnaire so all the questions were at the same order.

Basic questions were used to obtain data about the respondents' educational level, living and working situation, age and sex. This information is necessary to distinguish different groups because earlier research found that preferences differ by patient group (Salisbury et al., 2007). Next to the part about the preferences of different service aspects (explored with the AHP method, described below) other survey questions were used to answer the research questions mentioned above of this paragraph. Included in the survey were questions about the arrival pattern of patients; are they willing to have their CT scan right after their outpatient department? Which days and moments are preferred by the patients, so on which moments would it be busy? Will patients come on an other moment when they know it is busy in the waiting room? The questions were constructed with the help of some basic rules for making questions. First; not to use denials. Next; not to use vague numerals. Also important is never to use motivation for an answer like 'happy with… because…'. Last basic rule is not to ask two questions at once. There are also basic rules to set up alternatives to answer. The answers have to be connected to the questions; this seams logical but is not always the case. Next the answers should be clearly separable and balanced. Last if it is not possible to give balanced answer possibilities, try to avoid alternatives at all (Dijkstra & Smit, 1999).

5.2 Measuring preferences

There are different ways of measuring preferences. A possible method is making use of a multi criteria method, like conjoint analysis or analytic hierarchy process. This study used the last one as instrument to elicit preferences which is entirely different than conjoint analysis but the results are highly comparable (Duke & Aull-Hyde, 2002).

The Analytic Hierarchy Process is developed by Thomas L. Saaty in the late 1970s. The method is used to make a decision. It is based on the ability of humans to make sound judgements about problems and it structures the forces that influence a decision in a hierarchical way (Saaty, 2008). The principle behind it is that experience and knowledge of the people making decisions is at least as valuable as the data they use (Vargas, 1990). It is a well known multi criteria method (Dolan, 2008), and more and more used in health care. It is a flexible decision making method that helps respondents to make the best decision, also when qualitative and quantitative aspects need to be considered. It also reduces a more complex problem to one-to-one questions that are easier to answer (Katsumura et al., 2008). It is not based on a statistical methodology. That is why only '1' respondent is already enough to use AHP, because in origin it was used for one decision maker to choose between multiple alternatives. Because of the development in the passed years it is now possible to use it with a group; the decision maker exists of N respondents (Duke & Aull-Hyde, 2002).

According to Dolan (2008) a 'main strength of the AHP is that it is both methodologically sound and user friendly'. The pair wise comparisons the people have to answer are seen as 'one of the best ways to elicit judgements from people'. Dolan (2008) also mentioned the easy to understand results and the built-in consistency measure of the judgements that checks reliability of the analysis and reduces the chance of making procedural mistakes. AHP can also measure tangible and intangible criteria which is also a useful aspect (Vargas, 1990).

5.3 Design of the AHP hierarchy

Step one

The analysis exists of four different steps; define the problem, structure the decision hierarchy, construct a set of pair wise comparison matrices and use the priorities obtained to weigh the priorities in the level below (Saaty, 2008). The first step is to define the goal of the decision you want to make. Next to the goal also the different options that are considered and the criteria have to be clear because those are used to see how well the options meet the defined goal.

Step two

The second step is to construct the decision model. In this model the decision elements are arranged into a hierarchy. This hierarchal model puts the goal at the top and the criteria below. Beneath the diagram the option considered are arranged (Dolan, 2000; Dolan, 2008).

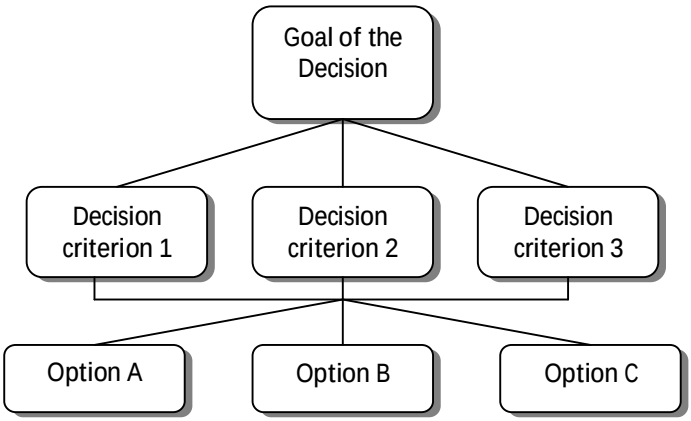


Figure 5.1; a basic AHP Decision model (Dolan, 2000 p.39)

Step three

In the next step the different comparisons are made. Every element in a higher level is used to compare the elements in the level below with respect to it (Saaty, 2008). The comparisons can be answered with the use of a 9-point scale from 1 equal important to 9 extreme importance.

A frequently used explanation of the absolute numbers of the scale is;

1; Equal importance

3; Moderate importance

5; Strong importance

7; Very strong of demonstrated importance

9; Extreme importance

The numbers 2,4,6,8 are intermediate definitions and are also possible answers (Saaty, 2008). It is also possible to use graphic or verbal scales.

Step four

In general after the eliciting the comparisons, the results are entered into a matrix. The relative importance is calculated by the right eigenvector of the matrix. This procedure is analogous to taking the average of all the comparisons. The final results are normalized so the total sum is one (Dolan, 2000). It is possible to see 'making the decision' as a last step of the process.

5.3 Inconsistency

The gathered AHP data is analysed with Team Expert Choice 11, a software programme that calculates with an eigenvector method the preferences and the priorities of those preferences. The programme has also an inconsistency measure. An inconsistent answer is like when you say that A is more important than B and B is more important than C and then say that C is more important than A. This is inconsistent because A should be more important than C based on the first two statements. This measure can be useful to detect possible errors in judgements. A general acceptable inconsistency ratio should be less than 0.1 (Expert Choice, 2000-2004).

5.4 AHP Hierarchy

In this study the hierarchy exists of criteria and sub criteria. There are no possible alternatives because the goal of this part of the study is to measure the preferences, not to choose an alternative. The criteria do reflect aspects of the different access systems so it is possible to see how the systems match with the preferences of the patients.

The AHP hierarchy model with the different criteria is as follows;

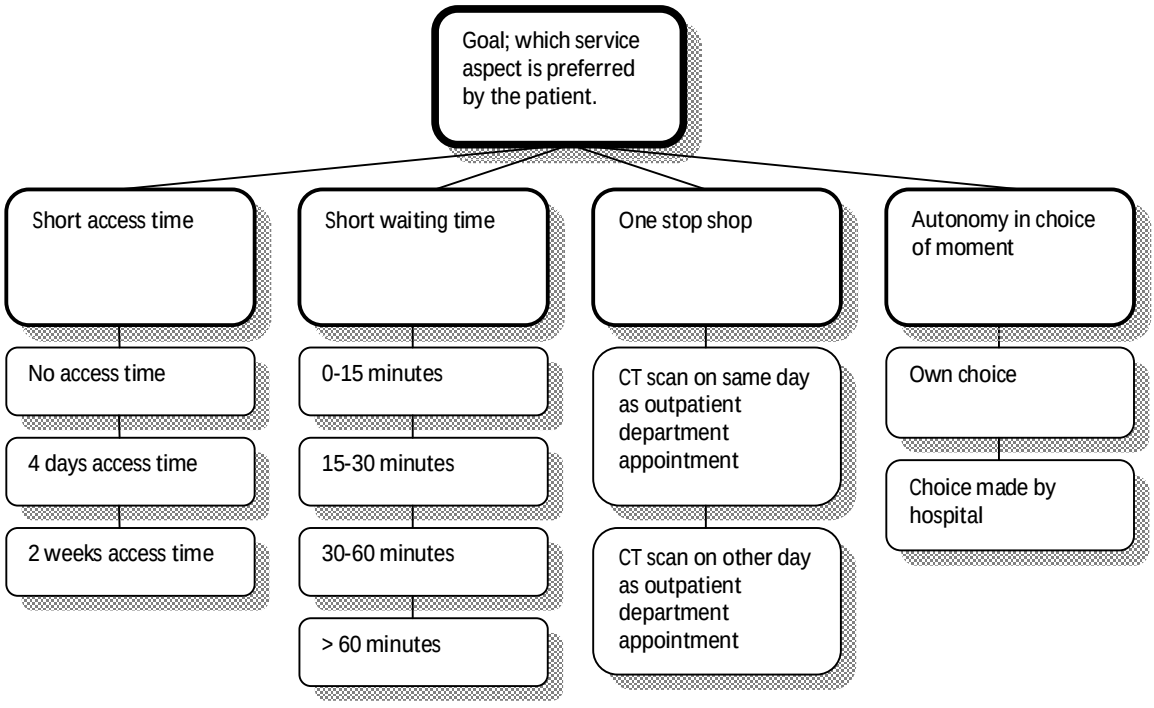


Figure 5.2; the AHP hierarchy model

As stated above the goal of the AHP model is to find out which of the different service aspects is preferred by the outpatients of the Radiology department of the AMC who are getting a CT scan. The service aspects are showed as the criteria in the model. The criteria are chosen because of their changeable aspects when comparing different access systems.

The first aspect is access time. Access time is the time in days between the appointment at the outpatient department, from which the patient is referred to the CT scan, and the actual scan. This aspect changes with a different access system because with the present appointment system in the AMC the patients have to wait about four days depending on the kind of CT scan. With a walk in system there is no access time at all because patient can walk in at any moment. The average access time in the Netherlands is 1,67 weeks (Kiesbeter.nl, 2009). The sub criteria used in the model are based on the walk in system (zero days), the actual situation in the AMC (four days) and the average of the Netherlands (1.67, which is used as two weeks).

The next criterion is 'Waiting time'. Waiting time is often used interchangeable with access time. In this study waiting time is used as the time (in minutes) that the patient is waiting in the waiting room before getting the CT scan. This service aspect can change extremely with a walk in system. Because it is possible that patients come at the same moments, busy moments in the waiting room will occur. This will result in a longer waiting time for the patients. The distinguished sub criteria are based on the present waiting time at the MRI at the AMC. There they also use an appointment system and we assume that both imaging techniques are comparable on service aspects. This is confirmed by the specialised laboratory assistants of the CT scan. The average waiting time at the MRI is 13.34 minutes. 71% of the patients are helped within 15 minutes (Figure 2). Because it is not known yet what the waiting time might be at peak moments with a walk in system, we used a range till > 60 minutes. Because with the CT scan many patients need a form of contrast they have to be 'prepared' to get the scan like drinking water every ten minutes for an hour. The patient has to wait in this hour but this is not calculated as 'waiting time'. Waiting time is the extra time patients have to wait before getting the CT scan. For example if the appointment of the scan is at 10.00 and the actual scan is at 10.15, the waiting time is 15 minutes.

Minutes	Number	%	Cumulative
0-5	58	54%	54%
5-10	10	9%	63%
10-15	8	7%	70%
15-20	7	7%	77%
20-30	7	7%	84%
30-45	4	4%	88%
>45	13	12%	100%
	107	100%	

	N	Average	St dev	Max
Waiting time in waiting room	107	0:13:34	0:23:08	1:55:00

Figure 5.3; waiting times at the MRI (AMC)

The third aspect is 'One stop shop'. One stop shop is the possibility to have more appointments or examinations at one day. In this way the patient do not have to come back to the hospital an extra time which can save time. With the current appointment system at the Radiology department this is not possible yet. With a walk in system this might be an option because patients can choose when they want to come; right after their outpatient department appointment or at an other moment. To measure in which degree patients like one stop shop the sub criteria are 'CT scan and outpatient department appointment on the same day' and 'CT scan and outpatient department appointment on an other day'.

The last criterion is 'Autonomy in choice of moment'. At this moment when patients are referred to the CT scan they get an invitation with a date and time from the planning department. They can not choose. With a walk in system patients are able to come at the day and time of their choice. Like with 'one stop shop' the sub criteria are to measure the degree they like to choose the moment of the CT scan. The sub criteria are 'Own choice of day and time of CT scan' and 'Hospital makes choice of day and time of CT scan'.

5.5 Analysis

To analyse the data that is collected with the Analytic Hierarchy Process the software programme Team Expert Choice 11 is used. First every pair wise comparison of every respondent was entered one by one into Expert Choice to calculate the inconsistencies. This study maintained the inconsistency ratio of 0.1 for the overall model. Many respondents did not answer completely consistent so respondents who were extremely inconsistent (ratio > 0.50) were left out of the analysis. Still respondents with an overall inconsistency score between 0.20 and 0.50 are considered as relatively high. Besides that not all the participants filled in the AHP part of the questionnaire so in total 83 were included in this part of the survey.

Because the programme has a limit of 15 participants other software was needed. All the pair wise comparisons were also entered in to an Excel spreadsheet. With Excel the geometric mean was calculated. The geometric mean is calculated as follows;

$$\left(\prod_{i=1}^{n} a_i\right)^{1/n} = \sqrt[n]{a_1 \cdot a_2 \cdots a_n}.$$

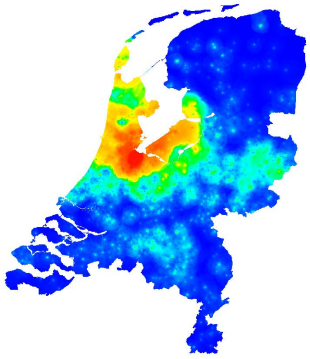
First the values of the pair wise comparisons are multiplied with each other. Second, of that product the nth root is taken. The results of the geometric means were entered as an individual model into Expert Choice to calculate the values and priorities of the service aspects. Also the inconsistency ratio of the total model was calculated because it had to be below the maximum ratio of 0.1.

6 Results

In the first paragraph a short overview of the current situation is given. In this way a comparison with a walk in system can be made. In paragraph 6.2 the descriptives of the respondents included in the analyses are summed up. The part that follows is about the preferences of the respondents. Not only the results from the Analytic Hierarchy Process, but also from the survey. Paragraph 6.4 gives the results of the different arrival patterns that can be distinguished. The preferences are also combined to some of the descriptives which are described in 6.2. These preferences are described in 6.5. 6.6 combines the results to see if a walk in system will match with preferences of the patients.

6.1 Current situation

In the past year (2008) 9258 outpatients got a CT scan at the AMC. Most of the patient were coming from the area that belongs to the basis healthcare providing area from the AMC; Noord Holland, Flevoland and (a part of) Utrecht. Especially Noord Holland which includes Amsterdam itself represents almost 70% of all the outpatients that needed a CT scan in 2008.



Region	Distance (average)	Number	Part
Noord-Holland	14,73 km	6453	69,70%
Flevoland	31,10 km	819	8,85%
Utrecht	15,24 km	744	8,04%
Zuid-Holland	43,91 km	371	4,01%
Gelderland	69,91 km	320	3,46%
Noord-Brabant	84,35 km	226	2,44%
Overijssel	108,66 km	167	1,80%
Friesland	103,12 km	53	0,57%
Limburg	139,53 km	43	0,46%
Zeeland	121,10 km	24	0,26%
Drenthe	126,67 km	23	0,25%
Groningen	155,55 km	15	0,16%
NEDERLAND	24,56 km	9258	100,00%

Figure 6.1; Distribution of patients in the Netherlands

In the current system patients go to the outpatient department were they have an appointment with a physician. When a physician thinks it is necessary to have a CT scan he or she sends a request for a specific scan to the Radiology department. Here the radiologist examines the application; is a CT necessary? Isn't an ultrasound better? Is the right CT requested? If the request is accepted an appointment is made by the planning department of radiology. The patient gets an invitation send to his or her home when the appointment is planned. It is not possible for the patient to choose the moment. It

is possible to reschedule it but this happens only rarely according to the specialised laboratory assistants of the CT scan.

6.2 Descriptives respondents

106 respondents were included in this analysis. The response rate was 86%. Of those 106 respondents 54 were male, 52 were female so this was almost equal. The average year of birth is 1956 with a minimum of 1923 and a maximum of 1999 (Figure 6.2).

Descriptive Statistics

	N	Minimum	Maximum	Mean
Year of birth	106	1923	1999	1956,30
Valid N (listwise)	106			

Sex

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	male	54	50,9	50,9	50,9
	female	52	49,1	49,1	100,0
	Total	106	100,0	100,0	

Figure 6.2; Year of birth and gender

The variable Educational level has been recoded in three categories. Low for no education/'basis onderwijs' and 'LBO/VBO/VMBO'. Intermediate for 'MAVO/eerste 3 jaar HAVO&VWO' and 'MBO' en High for 'bovenbouw HAVO & VWO/ WO & HBO propedeuse', 'HBO / WO bachelor of kandidaats' and 'WO doctoraal of Master'. 26.4 % of the respondents were educated at a low level. 32.1 % were having an intermediate education and a little bit more (37.7 %) were having a high education (Figure 6.3).

Education low - high

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1	28	26,4	27,5	27,5
	2	34	32,1	33,3	60,8
	3	40	37,7	39,2	100,0
	Total	102	96,2	100,0	
Missing	System	4	3,8		
Total		106	100,0		

Figure 6.3; Education

About a quarter of the respondents (24.5%) claims to have a full time paid job. 7.5% has a part time paid job. Another quarter (26.4%) is retired and 22.6% is unfit for work, unemployed or is doing housekeeping. About 5.7% is a student and 13.2 % claims to do something else which is not described above (figure 6.4).

Working situation

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	paid full time	26	24,5	24,5	24,5
	paid part time	8	7,5	7,5	32,1
	No work	24	22,6	22,6	54,7
	retired	28	26,4	26,4	81,1
	student	6	5,7	5,7	86,8
	other	14	13,2	13,2	100,0
	Total	106	100,0	100,0	

Figure 6.4; Work situation

Most of the respondents live with a partner but with no children; 40.6 %. Half of that (20.8 %) live with a partner and children. A small percentage (4.7) do not live with a partner but alone with children and 18.9% live single. About 13% says to live in an other situation than described in the answer possibilities (figure 6.5).

Living situation

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Single	20	18,9	19,2	19,2
	With partner, without children	43	40,6	41,3	60,6
	With partner and children	22	20,8	21,2	81,7
	With children, without partner	5	4,7	4,8	86,5
	Other	14	13,2	13,5	100,0
	Total	104	98,1	100,0	
Missing	System	2	1,9		
Total		106	100,0		

Figure 6.5; Living situation

About three quarters of the respondents were arriving at the hospital with own transport like their own car. 12.3 % used public transport to get to the hospital and 3.8 used a combination of own and public transport. 4.7 % used other ways to come to the hospital like a taxi. The average traveling time for the respondents was about 43 minutes but with a high deviation (29.3)(figure 6.6).

Transportation means

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Own transport	81	76,4	78,6	78,6
	Public transport	13	12,3	12,6	91,3
	Combi own public	4	3,8	3,9	95,1
	Other	5	4,7	4,9	100,0
	Total	103	97,2	100,0	
Missing	System	3	2,8		
Total		106	100,0		

Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation
Travel time in minutes	106	10	155	43,02	29,323
Valid N (listwise)	106				

Figure 6.6; Transport and travel time

All these descriptives describe the research population of this study. The long average travel time is a characteristic of an academic hospital; because many patients have to travel over al longer distance because they especially come to the AMC for their treatment. The other descriptive are almost all equally distributed. The only striking point is that many say they are educated 'high'; this might be coincidence.

6.3 Preferences

6.3.1 Service Aspects

Research question 1.1 was described as *What is the order of priority of the chosen service aspects (access time, waiting time, choice of moment and one-stop-shop)?* The results are given as scores of the priorities for every chosen service aspect (criterion). The scores can be interpret as a trend. It is also possible to see the scores as percentages when multiplied with 100.

Priorities with respect to: **Combined**
Goal: Which service aspect is preferred by the patient?

Short access time	**,224**
Short waiting time	**,188**
One stop shop	**,432**
Autonomy in choice of moment	**,157**

Inconsistency = 0,00554
with 0 missing judgments.

Figure 6.7; AHP results from main service aspects

As can be seen when we take a look at the main service aspects in figure 6.7 'short access time', 'short waiting time', 'one stop shop' and 'autonomy in choice of moment', the last one is judged as least important. It has a relative priority of 0.157. Next is, with a slightly higher score, 'short waiting time' with a score of 0.188. 'Short access time' has a score of 0.224 which comes next. These differences are not very big, but 'one stop shop' is judged as most important. It has a relative priority score of 0.432 which is much higher than the scores of the other aspects. So the order of priority is 1. One stop shop, 2. Short access time, 3. Short waiting time and 4. Autonomy in choice of moment.

The overall inconsistency rate of these aspects is 0.00554 which is much lower than the maximum norm of 0.10.

Below the hierarchy with the scores is showed (figure 6.8). The scores of the main service aspects are independent of the scores of sub criteria below.

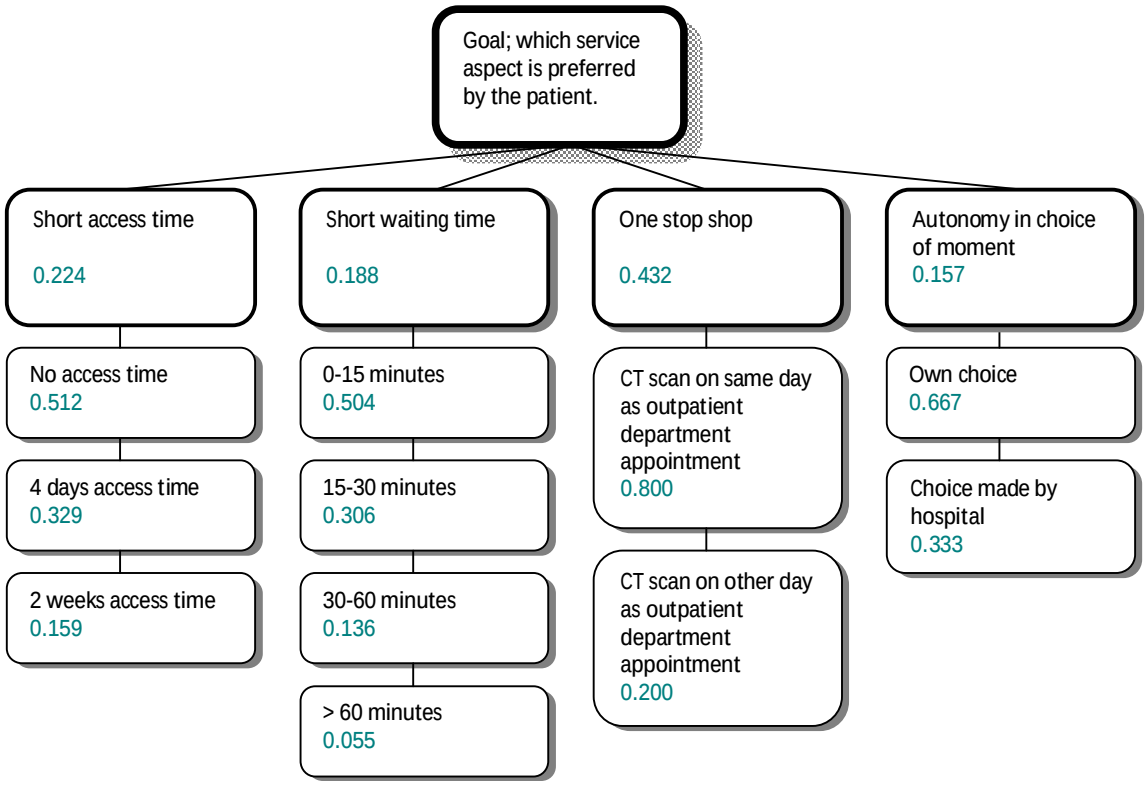


Figure 6.8; AHP hierarchy model with priorities

Of the criterion 'short Access time' the sub criteria 'no access time', '4 days access time' and '2 weeks access time' were distinguished. The overall inconsistency of these sub criteria is 0.06 which is still considered as ok. The difference between 'No access time' and '4 days access time' is slightly bigger than

the difference between '4 days' and 'two weeks'. This is so minimal that the gaps can be considered as equal.

Also 'short waiting time' had sub criteria expressed in time; from 0-15 minutes till more than 60 minutes. In this case the inconsistency rate is 0.17 which is more than the as maximum considered level of 0.10. So even though the extremely inconsistent respondents are left out, this question was still inconsistently answered by the patients. If we ignore the inconsistency the difference between 0.504 and 0.306 (0.198) is slightly more than between 0.306 and 0.136 (0.170). The difference between 0.136 and 0.055 is much smaller (0.081). This might mean that how longer patients have to wait, how less important the difference is; the first ten minutes are of more importance than ten minutes waiting while you already waited one hour. Because of the inconsistency this conclusion has not as much value as when it was consistent. The inconsistency might be a result of the extreme answers of the patients ('I want to wait as short as possible').

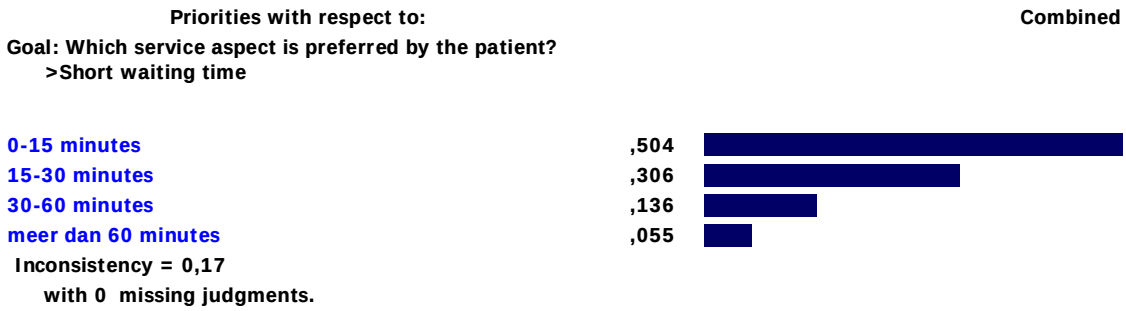


Figure 6.9; AHP results of service aspect 'Short waiting time'

Because the two other criteria 'one stop shop' and 'autonomy in choice of moment' have only two sub criteria they do not have an inconsistency rate. In the case of 'one stop shop' the patients prefer their outpatient department appointment and their CT san on the same day about four times more than if they have both on different days (0.800 vs. 0.200). With 'autonomy in choice' this difference is slightly less present. To make the choice by your own has a priority score of 0.667, while the option 'hospital makes the choice' is 0.333.

6.3.2 Acceptable norms

Two of the service aspects can be measured in time; waiting time and access time. With the AHP model a general picture is made, but a specific norm which the patients think is acceptable is not. Research question *1.2 What are the acceptable norms of the service aspects waiting time and access time?* was therefore necessary. Because of the different kinds of CT scans and therefore the different kinds of

preparations (for example oral contrast for an hour or an IV), just asking to their maximum acceptable waiting time was not possible. In the survey the patients were asked what their 'sign on time' was; the time in minutes which they had to come before their CT scan appointment. The question that followed was about their maximum acceptable waiting time when having an appointment included with their 'sign on time'. To calculate the real 'max acceptable waiting' the 'sign on time' had to be extracted from the 'max waiting time incl sign on time'. Unfortunately not all respondents filled in this question in the right way. For example; sign on time; 60 minutes – max. acceptable waiting time; 10 minutes. Because of this clearly made mistake two options were possible; exclude the wrongly filled in questions or to use the 'max acceptable waiting time incl sign on time' question as if the sign on time was already extracted. Because the differences between those options were minimal, the scientifically right way to exclude the respondents has been chosen. The same is applied to the question 'max acceptable waiting time with walk in'.

When patients have an appointment for their CT scan many of the patients think that the appointment have to be at the scheduled time and do not accept any waiting time. This is the case for 31% of the respondents. The mean maximum acceptable waiting time when having an appointment is 12.38 minutes (figure 6.10).

Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation
Maxwaitingtimeappointment	84	0	70	12,38	13,183
Valid N (listwise)	84				

Figure 6.10; Max acceptable waiting time with an appointment

With a walk in system patients are willing to wait a bit longer. Less respondents think they need to be helped right away (18.7%) than when having an appointment. The mean maximum waiting time in case of this sit and wait principle is 23.19 minutes (figure 6.11).

Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation
Maxwaitingtimewalkin	91	0	220	23,19	27,239
Valid N (listwise)	91				

Figure 6.11; Max acceptable waiting time without an appointment (walk in)

With walk in patients are almost willing to wait twice as long as with an appointment system (12 minutes vs. 23 minutes). This can also be explained when looking to the results of AHP. One stop shop is also twice as important as waiting time (0.432 vs. 0.188).

Next to the maximum waiting time, the maximum access time is also important. Not all patients included in the survey were directly sent from the outpatient department to the radiology department. Some patients needed regularly CT scans which are planned months before. The question about the time between their outpatient department and the CT scan can give a wrong view of the real access time for the regular outpatient department patients because the result might be to high or to low. This is because the answers are based on the months between the scans or because the patient filled in 'zero' based on their appointment with their physician (which is on the same day). Those patients have to be filtered out; respondents with 0 days or above 25 days as answer (which has been chosen as maximum).

Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation
Time between outpatient and ct	77	1	23	9,94	5,187
Valid N (listwise)	77				

Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation
Maximum access time	73	0	30	11,40	6,094
Valid N (listwise)	73				

Figures 6.12; Access time and max acceptable access time

Visible is that the average access time is almost 10 days, according to the patients. The patients think 11.40 day is acceptable as maximum. The current access time is visible in figure 6.13. Recognisable is a rising trend in access time.

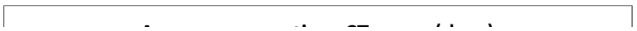


Figure 6.13; average access time

6.3.3 Stimulate behaviour

Research question *2.3 In which way is it possible to stimulate patients to spread their arrival times?* had to come with a possibility to optimize patient behaviour. In literature is not much written about walk

in like in this study; sit and wait (walk in). Also absent are studies about influencing patients to come on other moments. Many organisations see a peak in patient flows like at an emergency department as inevitable. In a study of Buetow (1995) is stated that the receptionists when operating as gatekeeper can influence patients' preferences for appointment times.

Communication is a very important tool to influence patients thoughts and therefore maybe their behaviour. With the assumption that patients might come on other moments when they simply know the busy moments, the question is; which kind of communication is preferred by patients to get information or are they still coming on their moment of preference (paragraph 6.4)? The options were; still coming on moment of preference, internet with info about busy moments, flyer with info or the physician telling about the busy moments. More answer possibilities were possible.

When on other moment

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	always on moment of preference	56	45,2	45,9	45,9
	Info busy moments internet	28	22,6	23,0	68,9
	Info busy moments paper	16	12,9	13,1	82,0
	Info busy moments physician	19	15,3	15,6	97,5
	Other	3	2,4	2,5	100,0
	Total	122	98,4	100,0	
Missing	System	2	1,6		
Total		124	100,0		

Figure 6.14; ways of communication

Visible in the frequency table is that most patients think they want to come on their moment of preference. This is about 45%. Preferred in ways of communication to get information about the busy moments in the waiting room is via internet; 22,6% of the respondents marked it as a possibility. Patients would like to see on which moments it is busy so they can decide to come on an other moment. The percentages of communication via a flyer and via their physician are almost equal; 12.9% and 15.3 %.

6.4 Arrival pattern

6.4.1 Referral at home

Second part of the Research questions is about the intended behaviour of patients who are visiting the Radiology department of the AMC. Research question 2.1; What would be the arrival pattern when patients get the advice of a CT scan at home? is answered by asking patients to give their first three

moments of preferences. To get a total picture of moments of preference all the answers are added up because you can assume that not all patients will come on their first moment of preference. You may assume that some patients who get a referral at Tuesdays while their first day of preference is Monday will come on Thursday when that is their second or third day of preference.

The results are given in a cross tabulation (figure 6.15) and in a bar chart (figure 6.16). A lowering line is detectable, especially when looking at the chart. Most patients would like to come at normal working days like Monday, Tuesday and Wednesday. These days has been 65, 64 and 69 times chosen as day of preference against 31, 28 and 6 times for Thursday, Friday and Saturday. Not only working days are favourite, also working times are preferred. A CT scan between 11.00 and 13.00 h. has been chosen most of the times as preferred (87 times) followed by 09.00-11.00 h. (73 times). Between 13.00-15.00 h. and 07.00-09.00 h. has been respectively 45 and 40 times chosen. Later in the afternoon are less favourite moments; 15.00-17.00 h. has been chosen 16 times but 17.00-19.00 h. and 19.00-21.00 h. both only one time.

So most patients would like to have a CT scan on a normal working day in the morning or in the beginning of the afternoon.

Day * Time Crosstabulation

Count

		Time							
		07.00-09.00	09.00-11.00	11.00-13.00	13.00-15.00	15.00-17.00	17.00-19.00	19.00-21.00	Total
Day	Monday	11	24	18	7	5	0	0	65
	Tuesday	10	19	23	10	2	0	0	64
	Wednesday	10	18	21	13	5	1	1	69
	Thursday	2	6	14	9	0	0	0	31
	Friday	5	4	9	6	4	0	0	28
	Saturday	2	2	2	0	0	0	0	6
Total		40	73	87	45	16	1	1	263

Figure 6.15; Cross table Day of preference x Time of preference

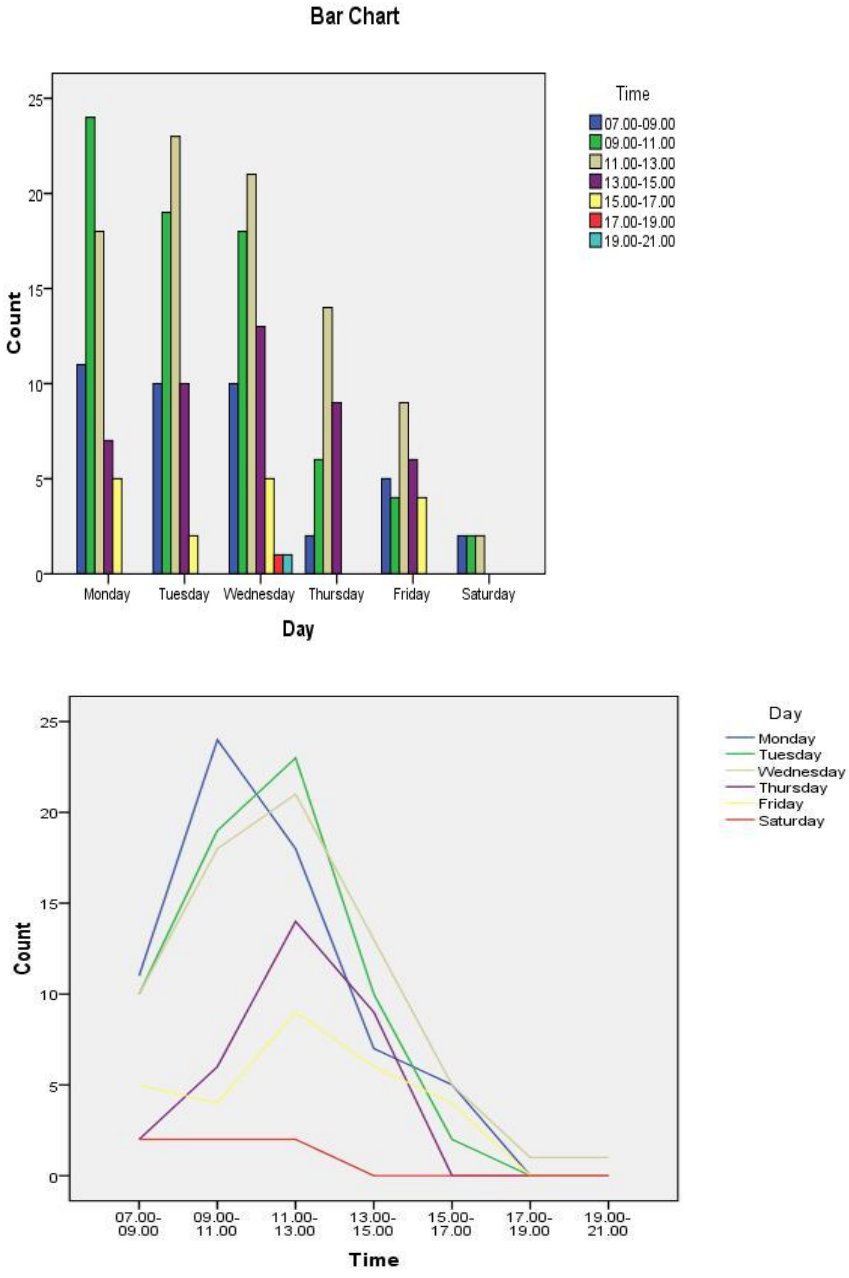


Figure 6.16; Bar Chart Day of preference x Time of preference and Line graph

6.4.2 Referral at outpatient department

The second scenario is answered with question *2.2 What would be the arrival pattern when patients get the advice of a CT scan at the outpatient department?.* It is unknown what the arrival pattern will be with walk in because it is currently not used and possible yet. We consider in this case that the patients will obtain one-stop-shop, meaning that all patients are referred to the CT scan during the consult at the

outpatient department and will walk in immediately. According to the results 76.4% of the patients would like to obtain 'one-stop-shop'.

Combi outpatient and ct scan

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Both on same day	81	76,4	77,9	77,9
	Both on other days	10	9,4	9,6	87,5
	No preference	13	12,3	12,5	100,0
	Total	104	98,1	100,0	
Missing	System	2	1,9		
Total		106	100,0		

If all patients obtain 'one-stop-shop' the arrival pattern will be as follows. Very early in the morning there are no consults yet, so no patients referred to the CT scan. This resulted in zero arrivals per 15 minutes. After 08.00 the first patients will arrive with peak moments at 10.30, 12.00 and 14.30. At 11.00 and 13.15 it is the other way around; less patients will arrive at these moments.

In the AMC there are two main CT scans and an emergency CT scan. For every outpatient slots of 15 minutes are calculated. For clinical patients 30 minutes are allocated. So when looking at the figure at least at 10.30 and 12.00 more patients will walk than the capacity can handle, using the current time of the slots.

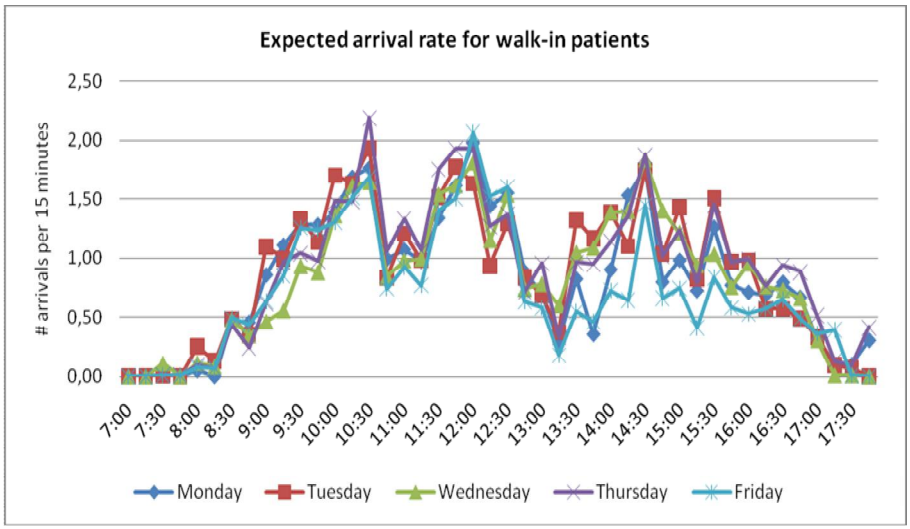


Figure 6.17; expected arrival pattern with one-stop-shop

6.5 Preferences of different patient groups

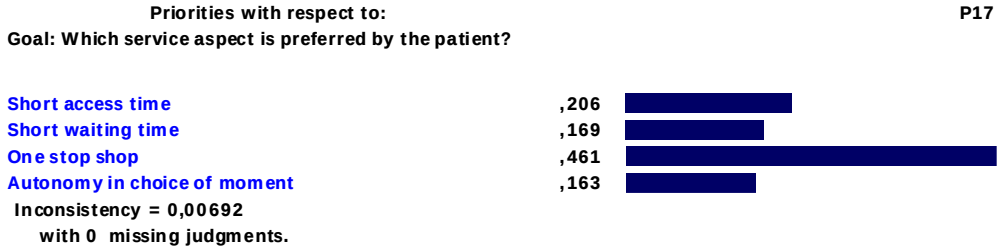
According to Salisbury et al. (2007) preferences differ by different patient groups. Gerard et al. (2008) and Rubin et al. (2006) distinguish gender, age and (un)employment as most important groups. In this study more different groups are distinguished. Next to the main groups of Gerard et al. and Rubin et al. travel distance in minutes and education are also taken into account.

Travel distance is in this case thought as important because of the service aspects. Assumed is that patients who have to travel further and longer can have other opinions about aspects like 'one stop shop'. This is the main reason this why it also included as a special group.

6.5.1 Gender

The first comparison made is between men (n=40) and women (n=43). Visible below are the both final results extracted from Team Expert Choice, the inconsistency included. Both models are consistent (0.00692 for men and 0.01 for women). For both groups the same trend is visible. 'One stop shop' ranks with a big difference first compared to the other aspects. Second is 'short access time', followed by 'short waiting time' and last 'autonomy is choice of moment'. The only difference is that the gap between the priorities of the service aspects is somewhat smaller with women than with men.

Men;



Women;

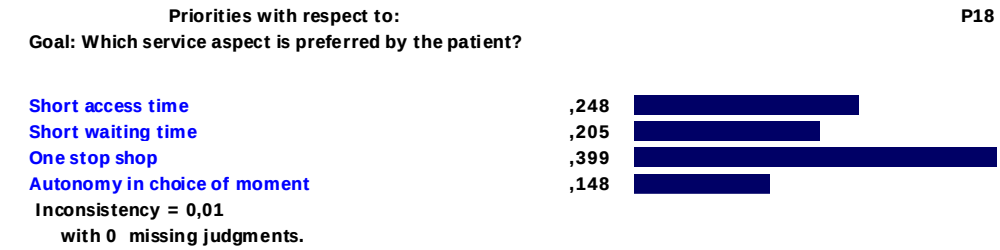


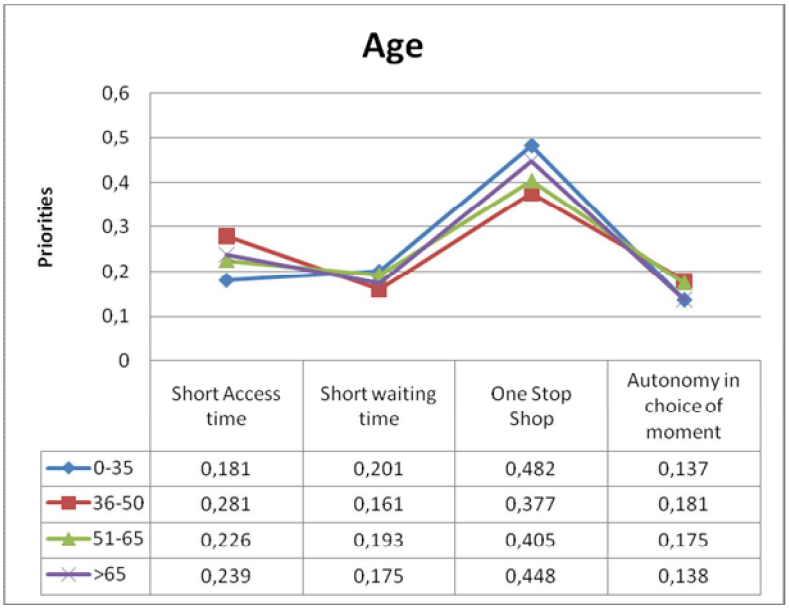
Figure 6.18; AHP results gender

6.5.2 Age

The variable year of birth is split up in four different categories. The age of persons is calculated and divided in the groups 0-35 years old, 36-50 years old, 51-65 years old and last older than 65 years. The

groups were divided as followed; for the first category n = 18, the second n = 13, the third group n = 37 and for the last category n = 15. Below the relative priorities of the groups are set up in a table.

The trends in the last two categories (51 - >65) are equal only the scores are a little bit different; 'one stop shop' is considered as most important, followed by 'short access time', 'short waiting time' and 'autonomy in choice of moment'. In case of the youngest respondents (age below 50) the trends are a bit different. The order of priority is not completely the same as with the last two categories, although the differences are not extremely big. In case of the 0 – 35 year old respondents the order is 1. One stop shop, 2. Short waiting time, 3. Short access time and 4. Autonomy in choice of moment. In the category 36 – 50 year old patients 'one stop shop' is still most important, followed by 'short access time' but 'autonomy in choice of moment' is third while 'short waiting time' is last.



	Short Access time	Short waiting time	One Stop Shop	Autonomy in choice of moment
0-35	0,181	0,201	0,482	0,137
36-50	0,281	0,161	0,377	0,181
51-65	0,226	0,193	0,405	0,175
>65	0,239	0,175	0,448	0,138

Figure 6.19; AHP results Age

6.5.3 Employment

Most respondents have a paid job; 30. Second are respondents who do house keeping, are unemployed or unfit for work; 21. 17 respondents were retired and 15 patients are students or are doing something else. The last category is combined because the group 'other' also exists of patients who are going to (high)school, just like students. For the categories house keeping etc., retired and student the pattern are almost equal. The same order of priority is visible only the scores of the relative priorities differ here and there.

	Short Access time	Short Waiting time	One Stop Shop	Autonomy in choice of moment
Paid job	0,191	0,178	0,419	0,211
House keeping / unemployed / unfit for work	0,293	0,219	0,347	0,141
Retired	0,245	0,167	0,461	0,128
Student / other	0,179	0,18	0,515	0,127

Figure 6.20; AHP results Employment

An interesting point is the order of priority for the respondents with a paid job. Most important, like with the rest, 'one stop shop', but second is 'autonomy in choice of moment'. With neither of the others this is the case. The differences are not big, but still there.

Priorities with respect to: **P17**
Goal: Which service aspect is preferred by the patient?

Short access time	**,191**
Short waiting time	**,178**
One stop shop	**,419**
Autonomy in choice of moment	**,211**

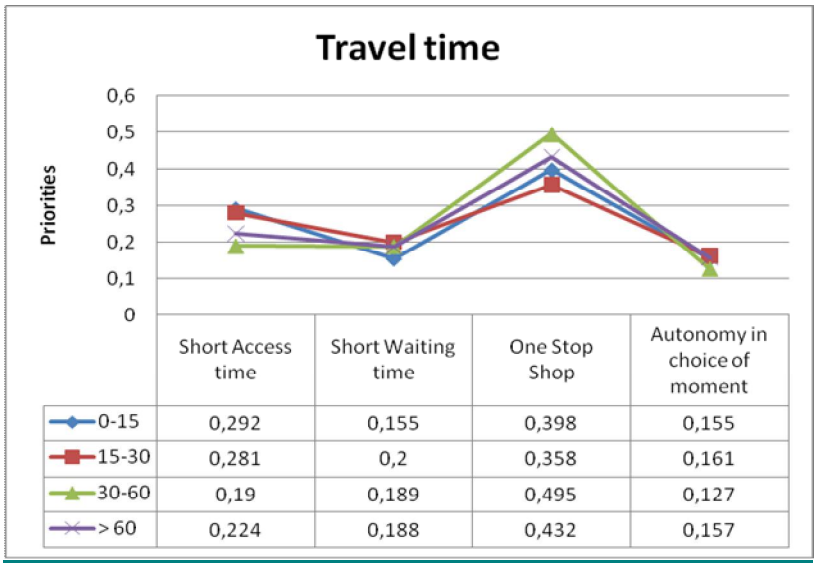
Inconsistency = 0,01
with 0 missing judgments.

6.5.4 Travel time

Also travel time is distinguished as a specific group that could be interesting when comparing with the service aspects. Travel time is measured in minutes and divided in four categories; short, intermediate long and very long travel time. Short is 0 – 15 minutes (n = 12), intermediate is 16-30 minutes (n = 33), long is 31-60 minutes (n = 26) and very long is more than 60 minutes travelling (n = 12).

Again the same trend is visible. 'One stop shop' ranks first followed by the other service aspects, but what was interesting to see is if there were differences between short travel time and long travel time. What is visible to see in the table below is that with longer travel time (30-60 minutes and > 60 minutes travelling) 'one stop shop' is relatively more important than the other service aspects when comparing it with short travel time (0-15 minutes and 15-30 minutes travelling). With longer travel time the relative

priorities for ‘one stop shop’ are 0.495 and 0.432. This results in lower score for the rest of the aspects; those have scores below 0.200 (except short access time with >60 min). When we take a look at shorter travel time the priorities for ‘one stop shop’ are 0.398 and .358 which gave higher scores for ‘short access time’, ‘short waiting time’ and ‘autonomy in choice of moment’; .155 - .292.



	Short Access time	Short Waiting time	One Stop Shop	Autonomy in choice of moment
0-15	0,292	0,155	0,398	0,155
15-30	0,281	0,2	0,358	0,161
30-60	0,19	0,189	0,495	0,127
> 60	0,224	0,188	0,432	0,157

Figure 6.21; AHP results Travel time

6.6 Scenarios

The order of priority of the different service aspects is clear, but to see which access system matches with the preferences different scenarios are made. The AHP scores of the sub criteria are multiplied with the score of the service aspect it belongs to. This calculation resulted in the following scores (figure 6.22);

Sub criteria	Priorities	Score
No Access time	0.512 * 0.224	0.114688
4 days access time	0.329 * 0.224	0.073696
2 weeks access time	0.159 * 0.224	0.035616
0-15 minutes	0.504 * 0.188	0.094752
15-30 minutes	0.306 * 0.188	0.057528
30-60 minutes	0.136 * 0.188	0.025568
> 60 minutes	0.055 * 0.188	0.01034
Same day	0.800 * 0.432	0.3456
Other day	0.200* 0.432	0.0864
Own choice	0.667 * 0.157	0.104719
Hospital choice	0.333 * 0.157	0.052281

Figure 6.22; Scenarios: Scores of sub criteria

With these scores scenarios can be calculated by adding up the scores belonging to a scenario (figure 6.23);

Scenario	Access time	Waiting time	One stop shop	Choice	Final Score
Best case scenario	Zero days	0-15 min	V	V	0.659759
One stop shop (waiting 15-30)	Zero days	15-30 min	V	V	0.622535
One stop shop (waiting > 60 min)	Zero days	> 60 min	V	V	0.575347
Appointment (own choice)	4 days	0-15 min	X	V	0.359567
Appointment (own choice, 15-30 min)	4 days	15-30 min	X	V	0.322343
Appointment (current situation)	4 days	0-15 min	X	X	0.307129
Appointment (own choice, 30-60)	4 days	30-60	X	V	0.290383
Appointment (waiting 15-30)	4 days	15-30 min	X	X	0.269905
Worst case scenario	2 weeks	> 60 min	X	X	0.184637

Figure 6.23; Scenarios of access systems

The following aspects describe the current situation; an average of 4 days access time, a waiting time less than 15 minutes, the scan on an other day and the moment of the scan chosen by the hospital. This scenario has a score of 0.307129. Every scenario with a higher score matches better with the preferences of the patient.

When looking at the different scenarios and their scores many scenarios score better than the current situation. When waiting times and access times rise with an appointment system, the scores are worse. Also when patients have autonomy in choice of moment but also have to wait over 30 minutes, the current system scores higher. When the current system only changes the autonomy in choice of moment the score will rise till 0.359567, which is higher than the current system.

Although the current situation is not the worst case situation regarding patient preferences; other scenarios have higher scores. Every scenario with 'One stop shop' scores better than the current situation; even with very long waiting times. So every scenario with 'no access time' and the scan and outpatient appointment on the same day (possibility One stop shop) will match better with the patients preferences than the current situation.

6.7 Summary of the results

- Patients give top priority to obtaining 'one stop shop', which is an attractive point of walk in.
- Service aspects 'Short access time', 'short waiting time' and 'autonomy in choice of moment' follow respectively.
- Only patients with a paid job rank 'autonomy in choice of moment' second.
- Patients with a long travel time give more relative priority to 'one stop shop' than other patients.
- Moments of preference of getting a CT scan are normal working days (Monday till Thursday) at normal working hours; preferably in the morning or early afternoon. Evening hours or weekend days are not preferred by the patients.
- Every scenario with 'no access time' and 'possibility of one stop shop' will match better with the patients preferences than the current situation.

7 Conclusions

7.1 Conclusions Preferences

In a changing healthcare system different adjustments are needed to improve quality and safety in healthcare. One of the important changes is to make healthcare more efficient and patient centered. A walk in system at the Radiology department at the CT scan might contribute to that. This study, focused on the patient side of the system, will tell if the walk in system really is more patient centered.

The four service aspects that can change with a walk in system and an appointment system have different priorities according to the results of the Analytic Hierarchy Process. All patients together think that having the opportunity for 'one stop shop' is most important. They would like to have their outpatient department appointment and their CT scan preferably on the same day, right after each other. One of the main points from different informal conversations was that they want 'to get it over with as soon as possible'. Also if that means they have to be in the hospital for a little bit longer. Patients would like to minimize their hospital visits. It is also important for them to get the results as soon as possible because in many cases it is necessary for their diagnosis and treatment. Also when we divide the total group into different subgroups gender, age, travel time and employment 'one stop shop' remains to be top priority for *every* distinguished category. The only difference is the relative priority; for patients that have to travel more than 30 minutes 'one stop shop' appears to be relatively more important than for patient who have travel less than 30 minutes. It is imaginable that patients with a long travel time would like to have the opportunity for 'one stop shop' because otherwise they have to travel the same distance at least twice; "I would be very happy to travel less to this hospital". This is an important aspect for an Academic hospital. Academic hospitals are in general treating more patients that have to travel over a longer distance than general hospitals.

Obtaining one stop shop is most suitable when using a walk in system. It might be possible with an appointment system but this requires a difficult planning system and a lot of thinking forward of the outpatient department physician. This because he needs to refer the patient to the radiology department; with 'one stop shop' and an appointment system he needs to know this in advance which might be in many cases rather difficult. Besides that it has been proven as less efficient; the more dependent factors the less efficient a planning system will be. 'One stop shop' with walk in is less difficult because patients can decide themselves if they would like to obtain one stop shop or not. This system also does not need a complicated planning system, because none of the scans are planned with a walk in system. About 10% of patients would not like to obtain 'one-stop-shop'. 12% do not have a preference and the other patients prefer to have their appointment and CT-scan on the same day (one-stop-shop). Reasons can be anxiety for the unknown of a CT scan, no time, or think one appointment is enough 'hospital' at one day.

The visible trend is that after the first service aspect, 'short access time', 'short waiting time' and 'autonomy of choice' are respectively next. The differences are minimal but it gives a picture of the trend of the priority of the service aspects. 'Short access time' is also connected to 'one stop shop' because 'one stop shop' means no access time. So when patients like 'one stop shop', they indirectly also like a very 'short access time'. Although with a walk in system the access time will reduce till zero, in many hospitals it is only a couple of days. This is still not much and is also thought as acceptable by the patients because the maximum acceptable access time almost 12 days.

'Short waiting time' is prioritised third by the patients. Waiting in the waiting room is, according to literature (Lacy et al., 2004), one of the most important aspects of patient dissatisfaction and therefore not preferred by patients. In this study short waiting time is not ranked first. This might be because waiting for a CT scan has some different aspects which we have to take into account. Many CT scans need a certain form of preparation. This can take a few minutes (get an IV) till an hour (drinking water or fluid contrast). Therefore the patients get a 'sign on time'. They have to come 15, 20, 30 or 60 minutes before their actual CT scan appointment. This time is actually needed to get a qualitative good scan, but for many patients it feels like they have to wait because they still are sitting in the waiting room, so their feeling about waiting is in many cases; "I already have to wait for a long time, so I rather prefer short access..". Although this opinion on the one side, they still do not want to wait much longer than necessary on the other side; "It's ridiculous that the planning is already behind this early in the morning!". Patients get irritated when their appointment is later than planned. When having an appointment they want to wait 12 minutes longer than planned (sign on time excluded). With a possible walk in system they want to wait for a maximum of 23 minutes (preparation time excluded). These numbers are between earlier studies of Bower et al (2003) and Huang (1994) so are in line with it. The difference between appointment and walk in means that patients are more tolerant about waiting when they have no appointment, so a good working walk in system might improve patient satisfaction. Not only in general but also about waiting times because with a walk in system there is more space left open before patients think it is unacceptable. This is positive because earlier studies showed that with a walk in system the average waiting time in the waiting room was higher compared to the appointment system (Arber & Sawyer, 1982).

Autonomy in choice of moment ranks last in the overall model. In other studies about access to healthcare choice of moment was sometimes preferred even if they had to wait one day extra. If patients have to choose between making the choice themselves and the hospital makes the choice they prefer the first option but compared to the other service aspects it is less important. Only patients with a paid job rank 'autonomy in choice of moment' second, after 'one stop shop'. A logical explanation for this is that patients with a paid job would like to plan their visits to the hospital because otherwise they might have

to take a day off for example. That Autonomy in choice of moment ranks last might be again because many CT scans are important for the patients diagnosis; the quicker the better. Another reason might be the area where the hospital is located. In that area educational level is low which can result in less jobs but also in less important jobs according to the patients. If they think their job is less important, choosing the moment of the scan might also be of less importance. It may only be partly of importance because according to the results over 37% of the respondents has a high education.

To optimize a walk in system patients have to come more spread over a day; when they will arrive all at the same moment, long waiting times in the waiting room occur. To avoid a crowded waiting room, the patients might change their behaviour when they are influenced. A study of Buetow (1995) showed that a receptionist can influence the patient and their choice for an appointment. Result from this study is that most patients still would like to come at their favourite moment when it is busy in the waiting room. Most preferred way of communication about busy moments is via the internet. So to let patients, who do not explicitly want to obtain 'one stop shop' (which is about 10%), know what the busy moments are so they can change their behaviour is via a contact person like the physician at the outpatient department or via the internet.

7.2 Conclusions arrival pattern

In case of the research questions about the intended behaviour there were two main scenarios that were interesting to investigate. The arrival pattern when patients do not want to obtain 'one-stop-shop' and the case they do want their appointment and CT scan on the same day. When we take a look at the results of the two different scenarios the first interesting point is that when patients can choose between six days of the week (Sundays excepted) and visiting hours from 07.00 – 21.00 they all prefer 'normal' working days and normal working hours. This means that special evening or weekend hours are not necessary for the patients getting a CT scan. From earlier studies this was not the conclusion. Cartwright (1990) and Murray (2003) both conclude that besides the normal working hours also weekend and evening hours are desirable. Here patients, especially young employees, preferred the possibility of appointments outside working hours. In this study employed patients rank autonomy in choice of moment higher than other groups but one stop shop still ranks first. This discrepancy with literature might be caused by the importance of the examination. Going to the GP with a minor problem can have different influence than for example a CT scan when you have cancer. Patients may think it is less necessary to take a day off when they have to go to the GP for a small problem. Moreover when working patients like 'one-stop-shop' they are already not able to go to work anyway, so that can be a reason why 'one-stop-shop' gets a high priority of patients.

Normal working days and times mean Monday till Thursday with a peak moment between 09.00 and 13.00. In the other scenario (walk in for all patients) normal working days and times are also the case because the outpatient departments do not have consulting hours at weekend days or evening hours. With this scenario peak moments occur at 10.30, 12.00 and 14.30. Especially the first two moments are in line with the chosen moments of the first scenario. This means that with both scenarios the busy moments will probably occur in the morning. Because almost 80% of the patients for certain prefer 'one stop shop' it is likely that the arrival pattern will most look like the second scenario. The 20% that does not want to obtain 'one stop shop' or does not have any preference might be influenced to come in the afternoon. This will spread the arrival pattern more over the day.

7.3 Walk in in the AMC

7.3.1 Walk in system

The most important research question is *How well does the walk in system match with the preferences of the patients?* This question combines the previous research questions and results to one question; how does the walk in system might score in an academic hospital? In this study we focused on four important service aspects which play a role in access systems. First 'short access time'; this aspect is in the current situation (appointment system) about four days, which is considered as acceptable. With a walk in system it will change into zero days which is preferred by the patients. 'Short waiting time' is at with an appointment system better controllable, but still not always absent. Patients would like to wait as short as possible and get irritated when their appointment is later than planned. With a walk in system the waiting time is more complicated to manage because everyone can decide themselves at which moment they would like to have a scan. Many patients also say to always come on their moment of preference, so influence the pattern might be difficult. Therefore the waiting time might rise at some moments which affect patient satisfaction, although patients accept longer waiting times with a walk in system. 'One stop shop' is with an appointment system very difficult to realize because of complicated planning systems. 'One stop shop' is therefore one of the main attractive points of walk in. It is also ranked first by the patients compared to the other service aspects. Last is 'autonomy in choice of moment'. Right now, with an appointment system, it is not possible for the patients to choose their moment, with walk in it is. Although it is not top priority of the patients; they still prefer to make the choice themselves. So if we look at the service aspects and the preferences of the patients; most important is 'one stop shop'. This can be most easily reached by implementing walk in. Also when we look at the other aspects; walk in is still preferred although waiting times might rise.

7.3.2 Scenarios

With the scores of the service aspects, different scenarios were calculated. These scores showed that the current system ranks not very high based on patient preferences. Even minor changes like giving

patients their own choice of moment will rise the overall score. Major steps, based on the preferences, could be made with every scenario with 'no access time' and 'CT scan and outpatient appointment on the same day'. Those scenarios scored best, compared to the current appointment system.

7.3.3 Implications

Several implications for the AMC and other interested hospitals follow from above conclusions. Because this study took place a an academic hospital, the patient population differs from general hospitals. Although severe and less severe patients were included in the study, it is possible this study might tell more about the preferences of patients with more complex ailments and who have to travel over a longer distance because these are characteristics of patients of academic hospitals. This might implicate that some of the service aspects are ranked as more important compared to patients with less complex ailments and who are living nearby the hospital. A possibility is that the differences in scores between 'one stop shop' and the other three aspects are smaller than it is in this study. Because with less severe patients it might be less urgent to obtain one stop shop while waiting time is more important for example compared to the results of this study. Although these possibilities might be the case; this study gives a trend of patient preferences and the chances are small that the same study in a general hospital will have completely opposite conclusions. Consequence is that if hospitals consider patient centeredness as a valuable and important point of improvement they should consider a walk in system because a walk in system is preferred by patient above a normal appointment system.

When implementing a walk in system hospitals should control the waiting times in de waiting room; when those are too long, patient will be less satisfied because waiting time is the only problem that might rise when taking the service aspects into account. Besides the service aspects also the arrival pattern and other stakeholders are important to keep in mind. With this study only the opinions of the patients are explored. Of course there are also other important stake holders who have to work with a new system like the referring physicians and the physicians at the radiology department. Before implementing a walk in system further investigation of their opinions is recommended to create support for the new system. Support is needed because some changes for the physicians and assistants are inevitable like more flexible work times.

Besides the opinions of other stakeholders a walk in system is a realistic option. According to the arrival pattern busy moments occur, but less busy moments can be filled with clinical patients. The busy moments are based on a current time slot of 15 minutes, but at this moment not every patient needs 15 minutes so the machine is not always in use. This means that it is possible that more patients are helped compared to the current system. A difficulty is that many patients need a kind of preparation before the actual scan. This requires, with a walk in system, good insights in the situation in the waiting room and of

course experience in the system; this can be reached over time. A possibility is to start with a less complex patient group like patients who only need a CT scan of for example a hand or leg to gain experience.

If it appears to be a success hospitals can consider to implement it at other scans at radiology or even at other departments. A successful implementation in a hospital is also of importance for other hospitals because they can use it as well to improve patient centeredness and patient flows.

8 Discussions

In this last chapter several points of discussion are described. Also some limitations of this study will follow.

8.1 Discussion and Limitations

This study is executed in an academic hospital. In academic hospitals also other patient groups will visit the hospital compared to general hospitals. Those other patients groups are in many cases having more complicated health problems. Therefore it might be questioned if these results can easily be generalised to other hospitals. Although this can be accurate, this study shows a trend in patient preferences and we do not think an other study in a general hospital will conclude the complete opposite. Patients still need CT scans for different medical reasons, also for complicated health problems at academic as well as at general hospitals.

When measuring the preferences with AHP, many respondents were inconsistent with their answers. In some case it was even unacceptable high. The average in this study is even 0.30 (without those above 0.50). Although the high inconsistency ratios of the patients the overall model has a very low inconsistency. So the average of all respondents is ok. An explanation is that the patients gave very extreme answers. This heighten the inconsistency rate. In this case patients think these service aspects are really important when visiting the hospital, maybe because at this moment hospitals do not meet the wishes of the patients. With only extreme answers the overall model should be inconsistent also. This is not the case so the variance in answers must be high. When the opinions of the patients differ from each other, the average cannot be very extreme. The expectation is, based on the frequencies of the answers at every pair wise comparison, that the respondents agree on 'One stop shop' but have more different opinions about the other aspects. The variance can tell something about the reliability. Because the variance was not included in this study this implicates an option for further research. Therefore it might limited the results of this study.

Next to this, we only studied four service aspects, which we think are most important when comparing access systems. Although those aspects influence patient satisfaction, other aspects which are not directly related to access systems might be of more importance for patients like 'friendliness of the receptionist' or 'cleanliness of the waiting room'. Those are not included in this study.

Other options for further research is the opinion of the other possible users of a new access system. Not only the patients are important but also the people who have to work with it like the radiologists,

laboratory assistants and referring physicians. If they do not support it, it will be a failure before it is even implemented.

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10 Appendices

Appendix I

Data collection literature study

The literature study is executed using the database PubMed and search engine Google Scholar in combination with several MeSH headings and key terms. The MeSH headings used are; Patient Satisfaction (with as Entry terms patient preferences) and Appointment and Schedules. According to Pubmed Patient satisfaction is described as *'The degree to which the individual regards the health care service or product or the manner in which it is delivered by the provider as useful, effective, or beneficial'* (Pubmed, 2009). Appointments and Schedules includes *'The different methods of scheduling patient visits, appointment systems, individual or group appointments, waiting times, waiting lists for hospitals, walk-in clinics, etc.'* (Pubmed, 2009). The MeSH headings are used in combination with different keyterms; (open) access, radiology, patient preferences, walk in and appointment (systems).

Patient Satisfaction (MeSH); 39290 hits, Appointments and Schedules (MeSH); 10888 hits

Patient Satisfaction (MeSH) & walk in; 122 hits, Appointments and Schedules (Mesh) & walk in; 79 hits

Patient Satisfaction (MeSH) & walk in clinic; 40

Patient satisfaction, access & appointment; 160 hits, Patient preferences, access & appointment; 14 hits

Patient satisfaction, appointment & radiology; 46 hits

The hits were first scanned on the titles. Interesting and useful titles were filtered out to read the summary. When the summary seems to be useful the whole article was selected to read.

Appendix II

Interview questions specialised laboratory assistants 26-03-2009

Interview afdeling Radiologie – donderdag 26 maart 2009
Inleiding

- Inloop: onderzoek naar combinaties van afspraak & inloop
- Onderzoek: patiëntpreferenties en simulatie om effect op wachttijden, bezetting e.d. te bepalen
- Voordelen: verminderde patiëntbezoeken aan ziekenhuis, minder interne wachtrijen, kostenefficiënt
- Theoretische aanpak: patiënten lopen direct door vanaf poli na verwijzing
- Scope: alleen CT01 en MX8000 (dus ex trauma)
- Doel interview: informerend, proces in kaart brengen inclusief praktische zaken die van belang zijn voor modellering

Parameters CT

- Wat zijn de openingstijden en -dagen van de CT?
- Wat is het openingsbeleid in de weekenden?
- Hoe zit het planningsschema er uit? Wordt er tijd gereserveerd voor bepaalde soorten patienten?
- Wat is de downtime / service time voor beide CT's? Wanneer vindt onderhoud plaats?
- Wat is de set-up tijd? Hoe vaak wordt deze uitgevoerd (bijv. verplichte calibratie tussen de middag, moet ct 'warm' zijn?)
- Zijn er verschillen qua soorten onderzoek op beide CT scans (opvallend: MDL vaak CT1, ORT vaak CT2)?
- Zijn er verschillende soorten slots? (bijv. in NKI-AVL: CT-general slots 10-20mins, CT-intervention 40mins en CT-angio 60mins)

Behandeling patiënt

- Welk percentage patiënten krijgt intraveneus- en / of oraal contrast toegediend? Komt het voor dat beide tegelijk gegeven worden?
- Klopt het dat het verplicht is om intra-veneus contrast altijd onder toeziend oog van een radioloog toe te dienen?
- Waar in het proces wordt de kreatinine-waarde bepaald? Wat zijn de consequenties voor het proces?
- Welk percentage patiënten komt voor een vervolgscan of herhalingsscan?

Planning & registratie

- Wat is het percentage afzeggingen
    - Vooraf door patiënt?
    - Gedwongen (iemand is niet nuchter of om andere reden niet toelaatbaar)?
    - Door overige redenen (bijv. claustrofobie)?
- Wat is het percentage no-shows?
- Wat zijn redenen van patiënten voor no-show?
- Wat is de huidige gemiddelde wachttijd in de wachtkamer?
- Zijn er klachten van patiënten over de wachttijd?
- Wat zijn andere klachten van patiënten?
- Zouden cijfers betreffende de verwachte aankomst van de MRI representatief zijn voor de CT scan?
- Wat is de capaciteit aan:
    - aantal radiologen op elk moment (tevens achterwacht)?
    - aantal laboranten op elk moment?
    - overig van belang?

  Denk hierbij ook aan lunchtijden, koffie pauzes e.d.
- Hoeveel laboranten worden per CT scan ingezet?
- Hoeveel fte wordt momenteel ingezet op de afdeling planning?
- Hoe vaak wordt er in overtijd gewerkt (in pauzes, na sluiting, in aantal uren per week)?

Proces

- Hoe belangrijk is het beoordelen van CT aanvragen door een radioloog – kan dit ook door bijvoorbeeld laboranten gedaan worden?
- Komt het voor dat een radioloog bij een scan gehaald moet worden, zo ja hoe vaak?
- Klopt het dat het protocol is dat na 2 keer verkeerd prikken iemand anders de injectie moet doen?
- Zijn er zogenaamde ‘special programs’ of onderzoeken waar tijdslots voor vrijgemaakt worden?
- Bestaat er een probleem omtrent het ontbreken van aanvragen bij aankomst?
- Is er een verschil in onderzoeken op beide scanners?
- Is er een overzicht (blauwdruk) van de afdeling (inc wachtkamer, prikkamer, ct scans)?
- Wat is uw visie op de mogelijkheden om de aankomsttijd bij een CT op inloop te beïnvloeden?
- Zijn er nog zaken niet genoemd die van belang kunnen zijn voor modellering?

Conceptueel model (zie volgende pagina)

- Van welke stappen weten / vermoeden jullie dat die AMC-specifiek zijn?
- Zijn er aanbevelingen ten aanzien van de juistheid, duidelijkheid, etc.?

Appendix III

Questionnaire

Academisch Medisch Centrum
Universiteit van Amsterdam

Deze vragenlijst is bedoeld voor patiënten die op dit moment niet in het ziekenhuis liggen. Als u op dit moment wel in het AMC ligt wilt u deze vragenlijst dan niet invullen en weer teruggeven? Bedankt!

Het is voor het AMC steeds belangrijker om de patiënt centraal te stellen. Daarom is het belangrijk om te weten wat uw mening is als u een bezoek brengt aan de CT scan. Bij de CT scan wordt momenteel gebruik gemaakt van een afsprakensysteem; er wordt een afspraak voor u gemaakt voor een bepaalde dag en tijdstip. Een eventuele andere mogelijkheid is een inloopsysteem; bij dit systeem kunt u zonder afspraak naar binnen lopen wanneer u dat wilt. Deze vragenlijst is onderdeel van een onderzoek naar de effecten van beide systemen. De resultaten kunnen gebruikt worden om het toegangssysteem aan te passen aan uw wensen. Met deze vragenlijst draagt u dus bij aan een beter ziekenhuis!

Deze vragenlijst bestaat uit 24 vragen en kost ongeveer 10 minuten om in te vullen. Bij de vragen staat uitgelegd hoe u deze moet beantwoorden. Wanneer u niet kunt kiezen, vul dan het antwoord in wat het dichtst bij uw voorkeur ligt. Vult u deze vragenlijst alstublieft in de wachtkamer in, zonder overleg met anderen. Het gaat uiteraard om uw eigen mening! Deze vragenlijst is volledig anoniem.

Bedankt voor uw medewerking!

1. Voor wat voor CT scan komt u?
   O CT buik (nier, lever etc.)
   O CT bot / ledematen (been, arm, pols, voet etc.)
   O CT longen
   O CT hoofd (hersenen)
   O CT hart
   O Anders, namelijk _____

2. Hoe lang moet u gemiddeld reizen om in het AMC te komen? (aantal minuten invullen)

   _____ minuten

3. Van welk soort vervoer maakt u gebruik als u naar het AMC gaat? (één antwoord invullen)
   O Eigen vervoer (lopen, fiets, auto)
   O Openbaar vervoer
   O Combinatie eigen- en openbaar vervoer
   O Anders, namelijk _____

4. Hoeveel dagen, na de verwijzing van uw arts op de polikliniek, heeft u gewacht op deze CT scan? (aantal werkdagen invullen)

   _____ werkdagen

5. Vindt u dit aantal acceptabel? (één antwoord invullen)
   O Ja
   O Nee

6. Hoeveel dagen wachten vindt u <u>maximaal</u> acceptabel? (aantal werkdagen invullen)

   _____ werkdagen

7. Hoeveel minuten moest u zich <u>eerder melden</u> voor deze CT scan? (Zie 'aanmeldtijd' op uw afspraakbevestiging) (één antwoord invullen)
   O 15 minuten
   O 20 minuten
   O 30 minuten
   O 60 minuten

   U heeft een afspraak voor deze CT scan en gaat naar het AMC.

8. Hoeveel minuten wachten in totaal (dus inclusief uw aanmeldtijd) vindt u acceptabel? (maximaal aantal minuten in vullen)

   _____ minuten

Stel; Er is een inloopsysteem. U heeft dezelfde CT scan nodig en u loopt op een willekeurig moment de wachtkamer binnen.

9. Hoeveel minuten wachten in totaal vindt u acceptabel? (inclusief het drinken van contrast, aanbrengen infuus etc.) (maximaal aantal minuten in vullen)

_____ minuten

Stel; u krijgt tijdens uw polikliniek bezoek te horen dat u een CT scan nodig heeft.

10. Wanneer zou u de CT scan het liefst willen? (één antwoord invullen)
    O Op dezelfde dag, gelijk na het bezoek aan de polikliniek
    O Op een andere dag die ik zelf kies
    O Geen voorkeur

Stel; u mag zelf bepalen op welke dag en tijdstip u de CT scan wilt hebben.

11. Voor welke drie dagen en tijdstippen heeft u voorkeur? Vul een '1' in voor uw eerste keuze, een '2' voor uw tweede keuze en een '3' voor uw derde keuze (drie keuzes invullen)

Dag / Tijd	Maandag	Dinsdag	Woens-dag	Donder-dag	Vrijdag	Zaterdag
07.00-09.00						
09.00-11.00						
11.00-13.00						
13.00-15.00						
15.00-17.00						
17.00-19.00						
19.00-21.00						

Stel; u mag zelf bepalen wanneer u naar het AMC gaat voor een CT scan (zonder afspraak).

12. Wanneer zou u op een ander moment komen dan de dag en tijdstip van uw voorkeur? (meerdere antwoorden mogelijk)
    O Ik zou altijd op de dag en tijdstip van mijn voorkeur komen
    O Wanneer ik op internet kan zien wat de erg drukke* momenten zijn in de wachtkamer
    O Wanneer ik een stencil heb meegekregen vanuit het AMC met daarin de erg drukke* momenten in de wachtkamer
    O Wanneer mijn arts op de polikliniek mij verteld heeft wanneer de erg drukke* momenten in de wachtkamer zijn
    O Anders, namelijk wanneer...
    _____
    _____

13. Stel; u kunt zonder afspraak gelijk doorlopen naar de CT scan na uw polikliniek bezoek, maar het is erg druk* in de wachtkamer. Wat zou u doen? (één antwoord invullen)
    O Een andere keer terugkomen met een afspraak
    O Een andere keer terugkomen zonder afspraak op een willekeurig moment
    O Toch doorlopen, ondanks de drukte
    O Anders

14. Wat is uw geboortejaar? (in cijfers)

    Geboortejaar _____

15. Wat is uw geslacht?
    O Man
    O Vrouw

16. Hoe is uw werksituatie? (één antwoord invullen)
    O Betaald werk; full time
    O Betaald werk; part time
    O Werkloos / arbeidsongeschikt / huishouden
    O Gepensioneerd
    O Student(e)
    O Anders

17. Wat is uw hoogst afgeronde opleiding? (één antwoord invullen)
    O Geen onderwijs / Basisonderwijs
    O LBO / VBO / VMBO (kader- en beroepsgerichte leerweg)
    O MAVO / eerste 3 jaar HAVO en VWO / VMBO (theoretische en gemengde leerweg)
    O MBO
    O HAVO en VWO bovenbouw / WO en HBO propedeuse
    O HBO / WO-bachelor of kandidaats
    O WO-doctoraal of master

* De wachttijd is langer dan wat u acceptabel vindt bij vr. 9

18. Hoe is uw woonsituatie? (één antwoord invullen)
    O Alleenstaand
    O Met een partner, zonder kinderen
    O Met partner en kinderen
    O Met kinderen, zonder partner
    O Anders

19. Wat is uw postcode? (alleen cijfers invullen)

____ ____ ____ ____

Het AMC wil van u weten waar uw voorkeur naar uit gaat. In de vragen 20-24 geeft u uw mening door aan te geven welk alternatief u verkiest boven de ander door een score in te vullen. Met de score geeft u aan in welke mate u iets liever hebt. U vult de score in aan de kant van het alternatief waar uw voorkeur naar uit gaat.

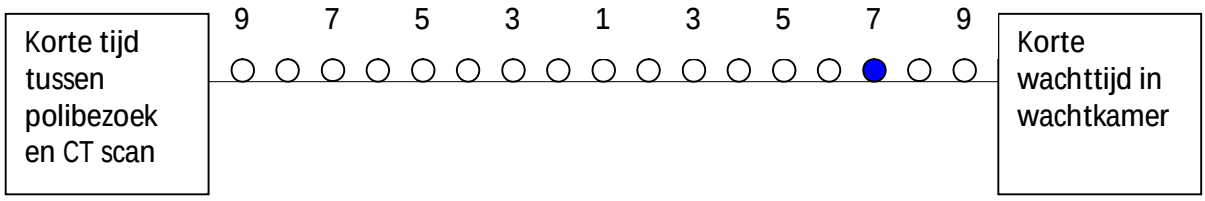
Uitleg alternatieven	
Toegangstijd (tijd tussen polibezoek en CT scan)	Het aantal dagen tussen de verwijzing naar de CT scan en de werkelijke scan
Wachttijd	Het aantal minuten dat u moet wachten in de wachtkamer
Polibezoek en scan op één dag	De combinatie van de afspraak van uw polibezoek en de CT scan op dezelfde dag
Vrije keuze in dag en tijdstip	Vrijheid van keuze voor de dag en het tijdstip van de CT scan

Uitleg scores	
1 =	de alternatieven zijn gelijk aan elkaar (deze score staat in het midden)
3 =	het alternatief vind ik iets belangrijker / heb ik iets liever
5 =	het alternatief vind ik redelijk belangrijker / heb ik redelijk liever
7 =	het alternatief vind ik veel belangrijker / heb ik veel liever
9 =	het alternatief vind ik extreem veel belangrijker / heb ik extreem veel liever
De scores 2, 4, 6 en 8 geven tussenliggende waarden aan, die u ook in kunt vullen.	

Het gaat om uw voorkeur, niet om wat u in werkelijkheid meemaakt!

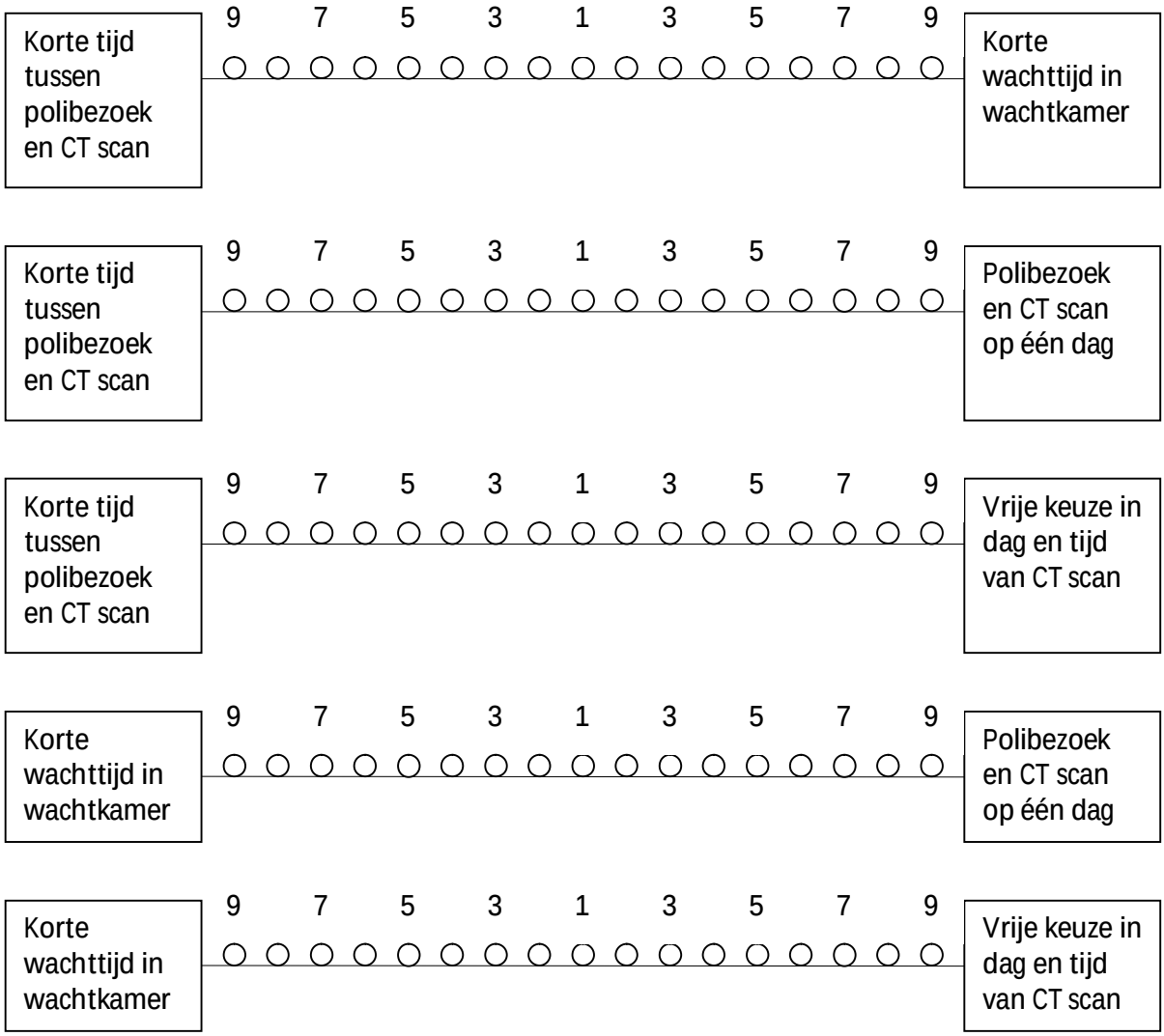
VOORBEELD:

Wat vindt u belangrijker als u naar het AMC gaat voor een CT scan en in welke mate? (één antwoord invullen)



Dit betekent; u vindt een korte wachttijd belangrijker dan een korte tijd tussen uw polibezoek en CT scan. U geeft dit de score 7 dus u vindt een korte wachttijd veel belangrijker dan een korte tijd tussen uw polibezoek en CT scan als u naar het AMC gaat voor een CT scan.

20. Wat vindt u belangrijker als u naar het AMC gaat voor een CT scan en in welke mate? (één antwoord invullen)



	9	7	5	3	1	3	5	7	9	
Polibezoek en CT scan op één dag	○	○	○	○	○	○	○	○	○	Vrije keuze in dag en tijd van CT scan

21. Wat heeft u liever als het gaat om de tijd tussen uw polibezoek en de CT scan (toegangstijd) en in welke mate? (één antwoord invullen)

	9	7	5	3	1	3	5	7	9	
Geen toegangstijd (0 dagen)	○	○	○	○	○	○	○	○	○	4 dagen toegangstijd
Geen toegangstijd (0 dagen)	○	○	○	○	○	○	○	○	○	2 weken toegangstijd
4 dagen toegangstijd	○	○	○	○	○	○	○	○	○	2 weken toegangstijd

22. Wat heeft u liever als het gaat om de keuze van het moment van de CT scan en in welke mate? (één antwoord invullen)

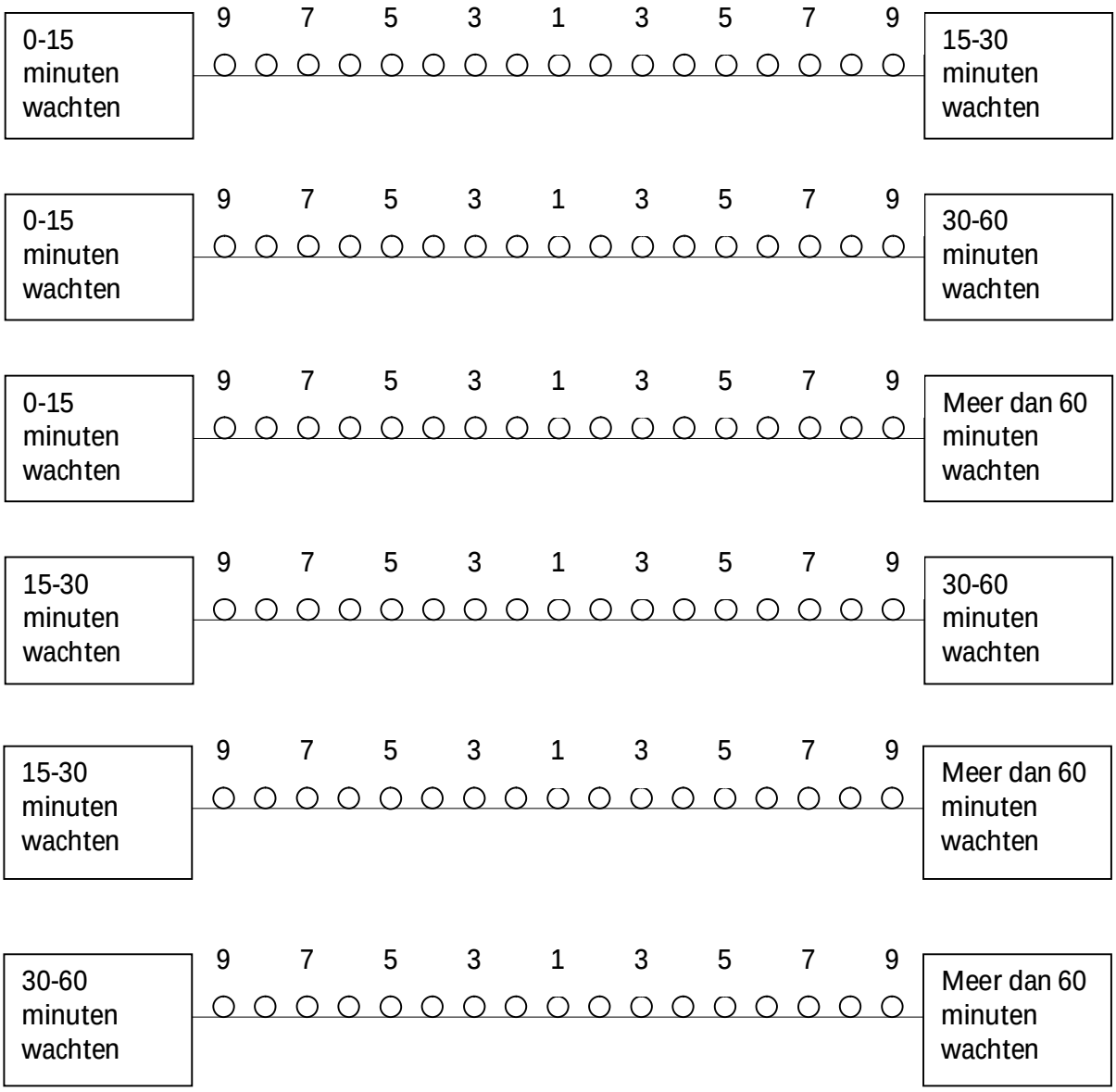
	9	7	5	3	1	3	5	7	9	
Zelf de keuze maken voor dag en tijd van scan	○	○	○	○	○	○	○	○	○	Ziekenhuis maakt keuze voor dag en tijd van scan

23. Wat heeft u liever als het gaat om de dag van de CT scan en uw polibezoek en in welke mate? (één antwoord invullen)

	9	7	5	3	1	3	5	7	9	
Beide op dezelfde dag	○	○	○	○	○	○	○	○	○	Beide op een andere dag

En tot slot…

24. Wat heeft u liever als het gaat om de wachttijd in de wachtkamer en in welke mate? (één antwoord invullen)



Heeft u nog op- en/of aanmerkingen over deze vragenlijst? Zo ja, welke?

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Bedankt voor het invullen!