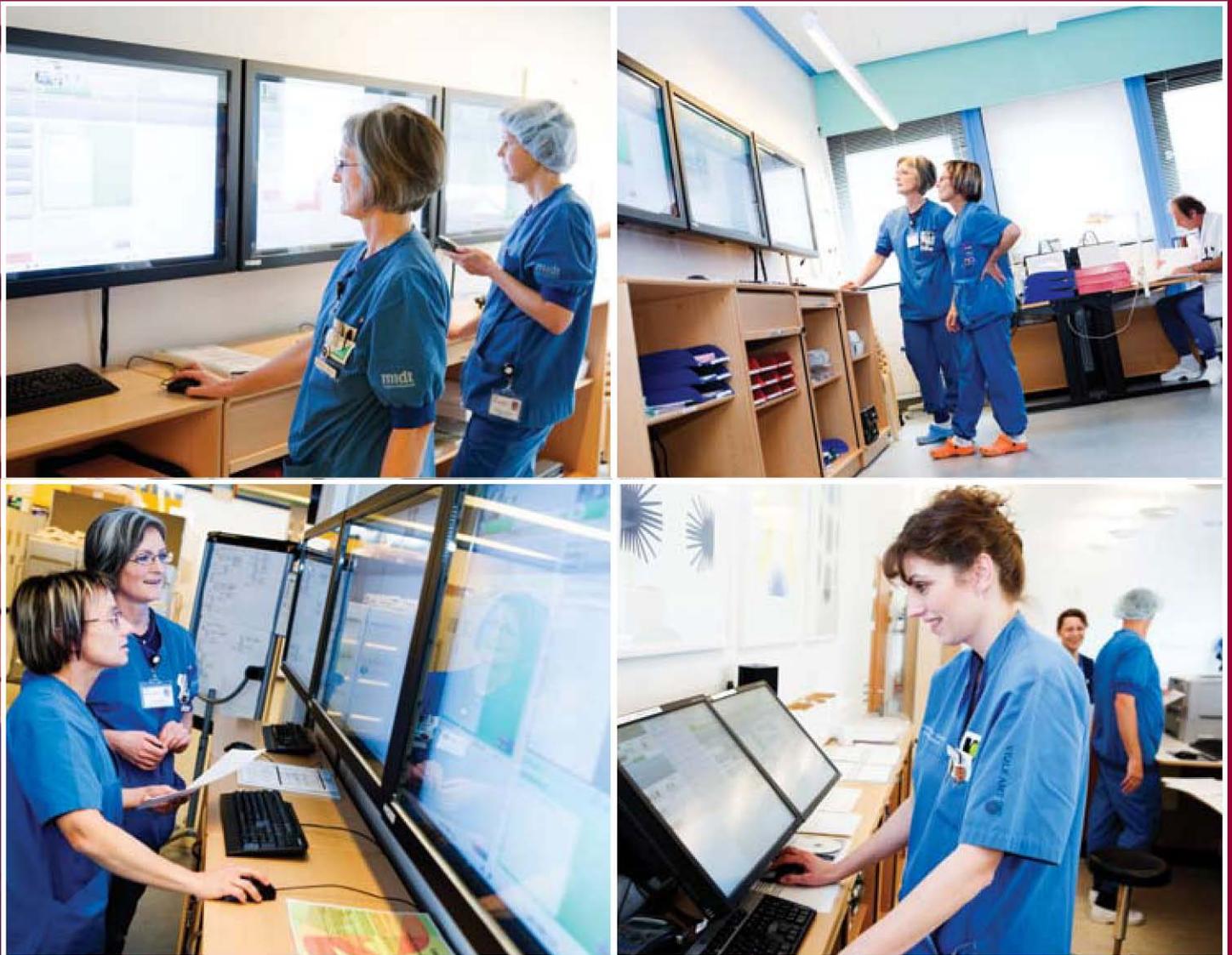# Health Technology Assessment of The Interactive Hospital (iHospital)

2009

SUMMARY
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HTA and Health Services Research
Centre for Public Health
Central Denmark Region

Health Technology Assessment of The Interactive Hospital (iHospital) -SUMMARY

This report should be referenced as follows:

For further information:

Preface

The Interactive Hospital (iHospital) is a new IT system developed to support health professional's working procedures in correlation with the execution of the actual day's surgical programme. The goal is to optimise the coordination of the complex cooperation around the execution of surgeries in a hospital. The system is developed within the research paradigm pervasive healthcare, and in many ways is an expression of innovative thinking within design in correlation with developing IT systems which support the health professional's working procedures.

The system is developed in close cooperation with health professionals at the Regional Hospital Horsens, Denmark, and is at present time implemented and running in several sections. As a result, the management of the Regional Hospital Horsens wished to examine the effect of this implementation. The choice fell on health technology assessment (HTA) as method for examining possible effects of the implementation of iHospital.

To choose HTA as method for assessment of iHospital is likewise an expression of innovative thinking. The assessment of the effect of IT systems within the framework of an HTA is a challenge for the researchers because it differs from HTA of for instance medicinal products or surgical procedures. There are two central challenges when assessing IT systems:

- IT systems are not often static from they day they are implemented in the organisation.

- It can be difficult to collect the total effect of IT systems because the effect often will exist in many different places in the organisation.

To complete the HTA of iHospital has also been an exciting development work in correlation with finding methods which are suited for assessing the effect of the implementation of IT systems in an organisation. The development work is obviously not done, but has just been started.

This HTA directs itself as point of departure at decision-makers, and it can function as support in decisions regarding a potential introduction of iHospital or other competing systems.

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April 2009

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Summary

This health technology assessment (HTA) is made in order to evaluate whether the implementation of the Interactive Hospital (iHospital) has led to efficiency improvement in the organisation of the daily surgical programme and the surgical process in general at Regional Hospital Horsens. Moreover, the HTA will clarify the use of and attitude to iHospital among the staff.

The iHospital is a new IT system developed within the field of pervasive healthcare/pervasive computing. The system consists of different constituent elements. The pivotal idea is to give health professionals a common awareness and an overview, primarily on large interactive screens, of the procedures of the day and the activities of their colleagues.

The report initially describes the central technology in the HTA (iHospital). Different data collection methods have been used in connection with this HTA. The collected data have been used across the sections of the report and an overall method section has thus been made. Organisational aspects of the implementation of iHospital are described followed by an economic analysis focusing on productivity. Furthermore, the patient perspective is briefly mentioned.

Overall method section

This HTA uses different data collection methods to illuminate the problems from several different angles as it is difficult to measure the effect of the implementation of IT systems in an organisation; moreover, the assumption is that possible effects would be found in different parts of the organisation. The data collection methods used were: observations, interviews, questionnaire survey, time registrations, register studies, qualitative review of unintended consequences and a literature review.

Different theoretical perspectives have been applied in the analysis of the collected data.

Technology

The purpose of this section is to introduce the reader to iHospital as a concept and as a system. The following elements are highlighted:

The organisation at modern hospitals is extremely complex. Conducting a highly specialised surgical procedure is a complex task involving surgeons, nurses, anaesthesiologists, patient, operating room and various types of equipment. Additionally, there is coordination of cleaning, patient transport, recovery etc. Even though the day at a surgical ward is carefully planned, delayed surgical procedures, acute patients and other unexpected events cause the surgical programme to change rapidly.

On the basis of the complex organisation of a hospital and with specific focus on the surgical ward, iHospital was developed in close cooperation with researchers from Aarhus University, the industry and Horsens Regional Hospital. The technological solution behind iHospital consists of a number of different technologies all developed to support one or more of the challenges that healthcare professionals meet in their striving for an efficient and fast management of the daily surgical programme.

Some of the technological solutions are presented on large interactive screens centrally placed at the surgical ward and smaller screens placed in the operating rooms and at other locations at the hospital. The screens of iHospital provide information on the day's surgical programme, staff, patients, operation equipment, surgical status etc.

The technology behind iHospital supports, among other things, that change in the surgical programme can be viewed immediately on all screens around the hospital. At the same time, it is possible for staff to send messages to each other using a chat function.

Organisational perspective

The purpose of the organisational perspective is to assess whether the implementation of iHospital has changed the organisational model at the surgical ward concerning management of the daily surgical programme; moreover, to clarify whether iHospital supports the central mechanisms in the optimisation of the organisational model at Horsens Regional Hospital. Furthermore, the purpose is to assess whether the implementation of iHospital has been important for the working environment among the involved staff. The following should be mentioned on the basis of the conducted analyses:

Case descriptions of different patient pathways before and after implementation of iHospital compared with a description of overall workflow at the surgical ward make it visible that there have not been changes in the basic organisational model at the surgical ward. This is in connection with the management of the daily surgical programme.

It is a prerequisite that the system is used in the daily work to have any effect on the organisation. The questionnaire survey shows that staff uses the different functions of iHospital in their daily work to a great extent.

The analysis shows that the use of iHospital provides a better overview and improved communication flow for the staff as well as supports coordination of the work. Theoretically, these elements are the most important mechanisms to optimise the organisation concerning management of the daily surgical programme.

Concerning working environment, the analyses show a positive attitude among staff to iHospital's influence on the working environment: better overview, fewer interruptions in the daily work and a positive impact on staff communication resulting in a more friendly tone. Moreover, several staff members mention that the use of iHospital causes less fuss during the workday.

Economy

The purpose of the economic assessment is to estimate a possible productivity gain by implementing iHospital at Horsens Regional Hospital. The following could be mentioned on the basis of the conducted analyses:

An analysis of the productivity at the hospital on the basis of DRG-values was made. The hospital had a marked increase in productivity in 2007 and 2008, i.e. in the period where iHospital was successively implemented. The sub-analysis does not show whether iHospital or other factors were the direct cause of this.

The subsequent analyses of time registration also show that iHospital could have had a positive effect on productivity. Calculations e.g. show that the average part of the opening hours at the operating rooms used productively (i.e. where surgical procedures were performed) has increased at operating rooms using iHospital.

The results of the questionnaire survey and the conducted interviews also support that implementation of iHospital has resulted in a productivity gain. At the same time the results also indicate that other factors are important for productivity at the hospital.

Generally, both organisational and economic analyses show that their results cannot and should not be interpreted without considering the context in which data were collected. iHospital creates the prerequisites for increasing productivity and creating a better working environment due to the improved overview, communication flow and support of the coordination. Use of these advantages also depends on the organisational set-up, management and many other factors. Use of the theory in the conducted analyses supports and strengthens the external validity of the results.

Patient perspective

The purpose of analysing the patient perspective was the expectation that implementation of iHospital would reduce the number of unintended consequences as staff would have a better source of information and an improved overview of the daily surgical programme. It was expected that this would cause staff to be able to give better and more precise information to patients and relatives. The following could be emphasised:

iHospital is originally not developed as a technology focused directly on the patients at hospitals. In this way iHospital is not a technology that patients can get in contact with or relate to as they are not aware of the possible influence of iHospital on their course of treatment. Only by using secondary sources, information about the possible effects on patients of iHospital can be obtained.

By the qualitative review of unintended consequences, eight events were identified which could potentially have been avoided if iHospital had been implemented at the time of the unintended event. This is the best estimate of events that could have been avoided if iHospital had been used optimally.

A large number of the staff in direct contact with patients and relatives who inform about the time schedule of the surgical procedure find that iHospital provides the opportunity for providing better and more precise information to both patients and relatives.

Perspectives

To our knowledge, this HTA is the first Danish HTA to assess a new IT system in the healthcare system focusing on organisation of working procedures among healthcare professionals. It is thus in itself an "experiment" in investigating how far the concept of the HTA would be useful when dealing with this type of problems. The report shows that it is possible to obtain useful results by using the HTA as the framework for analysis of the implementation of IT systems in the healthcare system.

The two central challenges in conducting HTAs of IT systems implemented in the healthcare system are the dependency of the results on the context and the fact that implemented IT systems in general are continuously being developed. Considering the fact that many IT systems are implemented in the healthcare system these years, it would thus be useful to start developing methods that would refine and expand the possibilities for assessing implementation of IT systems within a total HTA perspective.

An HTA like this would contribute to creating a certain transparency and shed light on the consequences of implementing a system like iHospital in a specific organisation. In this way, this report can contribute to forming a basis for decision concerning possible implementation of iHospital at other Danish hospitals.