The cost benefit of electronic patient referrals in Denmark

summary report

ACCA

European Commission

Danish Centre for Health Telematics

This report is published by ACCA and MedCom in collaboration with the European Commission Information Society Directorate – General.

Note: This is a summary of the full report produced by ACCA and MedCom called '*The cost benefit of electronic patient referrals in Denmark'*. For a copy of the report please send your name and postal address to sharon.cannaby@accaglobal.com or jsb@health-telematics.dk.

PURPOSE OF THE STUDY

There is little doubt that applying information and communication technology to healthcare (eHealth) delivers qualitative benefits to patient care, but do they bring any cost benefits? This is the question that the European Commission Information Society Directorate – General (DG INFSO) asked the Association of Chartered Certified Accountants (ACCA) and the Danish Centre for Health Telematics (MedCom) to investigate.

This study, which focused only on the quantifiable cost benefits associated with the operation of electronic patient referrals in the Danish healthcare system, attempts to find an answer to that question.

The study shows that full adoption of electronic referrals will give a potential saving of €3,512,146 or €0.65 per capita.

ELECTRONIC COMMUNICATION IN THE DANISH HEALTHCARE SECTOR

Denmark has been a prolific implementer of electronic communication in healthcare since the late 1980s. Today, the Danish healthcare sector sends over 32[1] million electronic messages each year and the vast majority of hospitals, general practitioners (GPs), laboratories and pharmacists are able to correspond using electronic communication. (Table 1)

TABLE 1

Access to Electronic Document Interchange across the Danish healthcare sector (March 2004)[2]

	Number	%
General Practitioners	1,995	92%
Specialists	490	62%
Pharmacies	332	100%
Hospitals	63	100%

The degree of electronic communication varies according to the message type. For example, although the majority of prescriptions, reimbursement requests, discharge letters and laboratory results are transmitted electronically, other messages, such as patient referrals to hospital, are still predominantly transferred on paper (59%)[3].

SCOPE OF THE STUDY

A full analysis of the cost benefits of electronic communication in the Danish healthcare sector would take significant resources, both time and money. Therefore, it was decided to restrict the study to just one message type: patient referrals to hospital. Nearly 60%[4] of patient referrals to hospital in Denmark are still sent on paper, so the study looked at the difference in costs between electronically transmitted referrals and referrals by post or fax.

TABLE 2

Annual patient referrals to hospital in Denmark

	Number	%
Electronic referrals	377,269	41%
Posted referrals	217,160	24%
Faxed referrals	325,739	35%
Total	**920,168**	**100%**

[1] www.medcom.dk
[2] www.medcom.dk
[3] www.medcom.dk
[4] www.medcom.dk

THE STAGES OF THE STUDY

There were four main stages to the study:

- mapping the different information and work flows between GP and hospital
- identifying the time that each of these information flows takes
- calculating the cost of each information flow
- comparing the results to identify which is most cost effective.

Stage One

The first stage of the study considered the different ways that information may flow between a GP and a hospital whenever a patient is referred for hospital treatment. The GP produces the referral electronically on the Electronic Patient Record system and then selects one of three communication flows:

- sends it by post or fax to the hospital
- dispatches the referral electronically to the hospital where it is then printed off and processed as though it were paper based
- dispatches the referral to the hospital electronically where it is then processed electronically.

Stage Two

Once the different types of information flows had been identified, they each had to be mapped out in detail. This was done by identifying a sample group of GPs and hospitals using the three identified communication flows. The sample chosen included five hospital regions[5], 20 GP surgeries and covered 13 different hospital departments[6]. These hospital departments receive 41,235 referrals a year, or 4.5% of all referrals in Denmark.

The hospitals and GPs were asked to complete a time and motion study describing in detail each step of the referral process including the time taken to process the initial referral, the percentage of referrals that were returned due to incomplete or illegible forms and the time taken to correct the returns. They were also invited to comment on any perceived advantages and disadvantages of electronic referrals.

Stage Three

The third stage of the study involved identifying the costs associated with the three referral patterns and then calculating the total cost of each. Three types of expenditure were identified:

- **handling costs** were defined as the total cost of time taken by the GP, practice staff and hospital staff to process each referral
- **operational costs** were defined as the cost of physically transferring each referral from the GP to the hospital
- **equipment costs** were defined as the proportionate cost of hardware, software and training needed to produce, process and send (or receive) each electronic referral.

Handling costs

Handling costs were calculated using the detailed data collected from the time and motion study. The data was first analysed to give the average processing time of each of the referral patterns and then staff costs were attached to give the average handling cost for the three different information flows.

Operational costs

The time and motion study identified three ways that GPs send referral forms to hospital: by post, fax or electronically.

[5] Funen, Vejle, Viborg, Copenhagen and H:S (The Copenhagen Hospital Coorporation)

[6] Seven hospitals are presented in the analysis.

Equipment costs

Equipment costs were difficult to calculate as electronic referrals are just one of the many functions undertaken by GP and hospital information systems.

After consulting the manufacturers it was decided to use a proportionate average cost of equipment for GPs and to use the proportionate hospital equipment cost that was calculated for a previous MedCom project.

Stage Four

The fourth and final stage of the study compared the costs of each of the three different communication flows to find an answer to the question: What is the cost difference between patient referrals that are transmitted electronically and patient referrals that are sent by post or fax?

COMPARISON OF COSTS

The study found that there were significant differences in costs between electronic and paper based referrals.

Handling costs

The difference in handling costs between the three referral processes is detailed in Table 3. This shows that the handling cost of a referral sent by post or fax is €4.33 more than a fully electronic referral.

As 59% (or 542,899) of all referrals in Denmark are currently sent non-electronically, **this suggests a potential saving of €2,350,753 per year if all paper referrals were processed electronically.**

The table also demonstrates that additional savings of €1.46 would be possible per referral if each hospital that currently receives electronic referrals and processes them manually switched to electronic processing.

Table 3 only looks at the handling cost of an initial referral. About 2% of all referral forms submitted to hospitals have to be returned to the GP due to illegibility or incompleteness. A fully electronic system would help reduce the incidence of returns by increasing legibility and incorporating inbuilt completeness checks and so would offer further savings.

TABLE 3

The difference in handling costs between the three referral processes

	Total handling costs €
Referral produced electronically and sent by post or fax	4.33
Referral produced and sent electronically then treated as a paper copy by hospital	1.46
Referral produced and sent electronically and treated electronically by hospital	0

Operational costs

The average cost of sending a referral by post is €0.27[7] and the cost of sending the referral electronically or by fax is €0.16[8]. This suggests that adopting a fully electronic referral system would give savings of €0.11 per posted referral. **If all 217,160 posted referrals were sent electronically the total saving would be €23,888.**

[7] The cost of a stamp is €0.60 and each letter contains on average 2.2 referrals.

[8] Patient confidentiality may be at risk when referrals are sent by fax.

Equipment costs

The average cost of equipment for GPs and hospitals is very difficult to calculate because:

- there are a number of systems available, each with a different price
- the cost of equipment depends on the number of work stations
- the systems are multifunctional so it is difficult to isolate the cost for electronic referrals
- the actual price of the systems is confidential and the prices used are therefore estimates.

After consulting a number of suppliers it was decided to assume that a GP must invest on average €900 every five years to transfer referrals electronically to the hospitals. Therefore, with 1995 surgeries across Denmark, the total GP investment cost in electronic referrals per year can be estimated as €359,100.

The average cost of equipment for hospitals is taken from a previous MedCom project concerning the specific communication of referrals and discharge letters between hospitals. This gave an estimated price of €40,750 for each of Denmark's 15 hospital regions over five years. The total equipment cost for hospitals is therefore €122,250 per year.

SOCIETY COST

There is one other cost that can be linked to postal rather than electronic referrals: the cost of delay in treatment for the patient. The study found that about 217,160 referrals per year are sent to the hospital by post and that these take an average of 1.33 days longer to reach the hospital than an electronic referral or fax. This extends the patient waiting time and, for patients unfit to work, creates a cost to society. GPs estimate that between 5% and 10% of patients referred to hospital are classed as unfit for work at an average cost to society of €93[9] per day. This suggests **that the increased patient waiting times caused by posting referrals could cost society approximately €1,343,026 per year.**

WHAT DO THE GPS AND HOSPITALS SAY ABOUT ELECTRONIC REFERRALS?

The GPs, secretaries and hospital staff that participated in the study were asked if they had found any particular advantages or disadvantages in using an electronic referral system. The advantages they identified far outweighed the disadvantages and included:

- a faster referral process
- standard patient data already input
- the referrals delivered to the right department
- system checks help ensure completeness
- printed forms are easier to read by hospital staff.

The disadvantages identified included:

- system failure
- additional paperwork must be posted
- GP focus may be directed at the screen not the patient.

[9] Loss in production: GDP per capita (2002) €93

CONCLUSION

Initial findings from this study suggest that widespread adoption of electronic patient referrals would be of significant cost benefit to the Danish health economy and would offer potential savings of €1,893,291 in direct costs per year (Table 4). If society costs are included this figure could increase to €3,236,317 per year.

TABLE 4

Annual potential savings from direct costs from adopting a full electronic referral process in Denmark

	€
Handling costs	2,350,753
Operational costs	23,888
Less equipment costs	-481,350
Total	**1,893,291**
	or €5.02 per referral

Table 5 describes how the potential savings grow as the number of referrals sent electronically increases. The **total savings to date** in direct costs, **with 41% of referrals sent electronically, is estimated at €1,168,825** or €0.22 per capita.

At present 92% of Danish GPs have an electronic referral system, therefore, for referrals to be 100% electronic the remaining 8% of the GPs will have to buy equipment at an estimated cost of €31,320. If all referrals were then sent electronically the total saving would potentially increase to €3,512,146 or €0.65 per capita.

Further research now needs to be undertaken to determine if this finding is replicated across all electronic communication in healthcare. In particular, studies need to be made of each of the different types of electronic communication systems currently used by healthcare professionals, including the electronic transfer of: prescriptions, laboratory requests and results, discharge letters and requests for reimbursement. This research will take time and significant resources but once complete will provide an answer to the question asked by DG INFSO: What are the quantifiable benefits of electronic communication in healthcare?

ACCA and MedCom hope to contribute to this research and plan to meet DG INFSO to discuss the possibility of extending this study to other areas of electronic communication in healthcare.

[10] Equipment costs are a fixed cost as they are not dependent on the number of referrals

TABLE 5

Potential savings	% of electronic referrals	Savings from direct costs €	Less equipment costs €[10]	Savings from direct costs less equipment costs €	Saving per capita €
No referrals sent electronically	0	0	0	0	0
41% of referrals sent electronically	41	1,650,175	-481,350	1,168,825	0.22
Additional 59% of referrals sent electronically	59	2,374,641	-31,320	2,343,321	0.43
All referrals sent electronically	100	4,024,816	-512,670	3,512,146	0.65

ACCA (THE ASSOCIATION OF CHARTERED CERTIFIED ACCOUNTANTS)

ACCA is the largest and fastest-growing international accountancy body in the world, with 320,000 students and members in 160 countries. ACCA has an extensive network of over 70 staffed offices and other centres around the world.

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MEDCOM

MedCom was founded in December 1994 to lead on the development of national EDI standards for the most frequently exchanged messages between the primary and secondary healthcare sector in Denmark. Since then our role has been significantly expanded and we now contribute to the development, testing, dissemination and quality assurance of all electronic communication across the Danish healthcare sector.

Our latest project aims to introduce internet technology to healthcare communication so that modern IP-based, but still secure electronic communication can take place between healthcare providers and their patients.

MedCom is now considered a European leader in the field of electronic healthcare communication and we were proud to receive an honourable mention at the eHealth 2003 Ministerial Conference.

MedCom is located within the Danish Centre for Health Telematics, a project organisation established by the County of Funen to give advice and support to health bodies on the use of health telematics. MedCom is funded by The Ministry of Health, The Ministry of Social Affairs, The Association of County Councils in Denmark, Copenhagen Hospital Corporation, Copenhagen and Frederiksberg Local Authorities, The National Board of Health, The Danish Pharmacy Association and DanNet.

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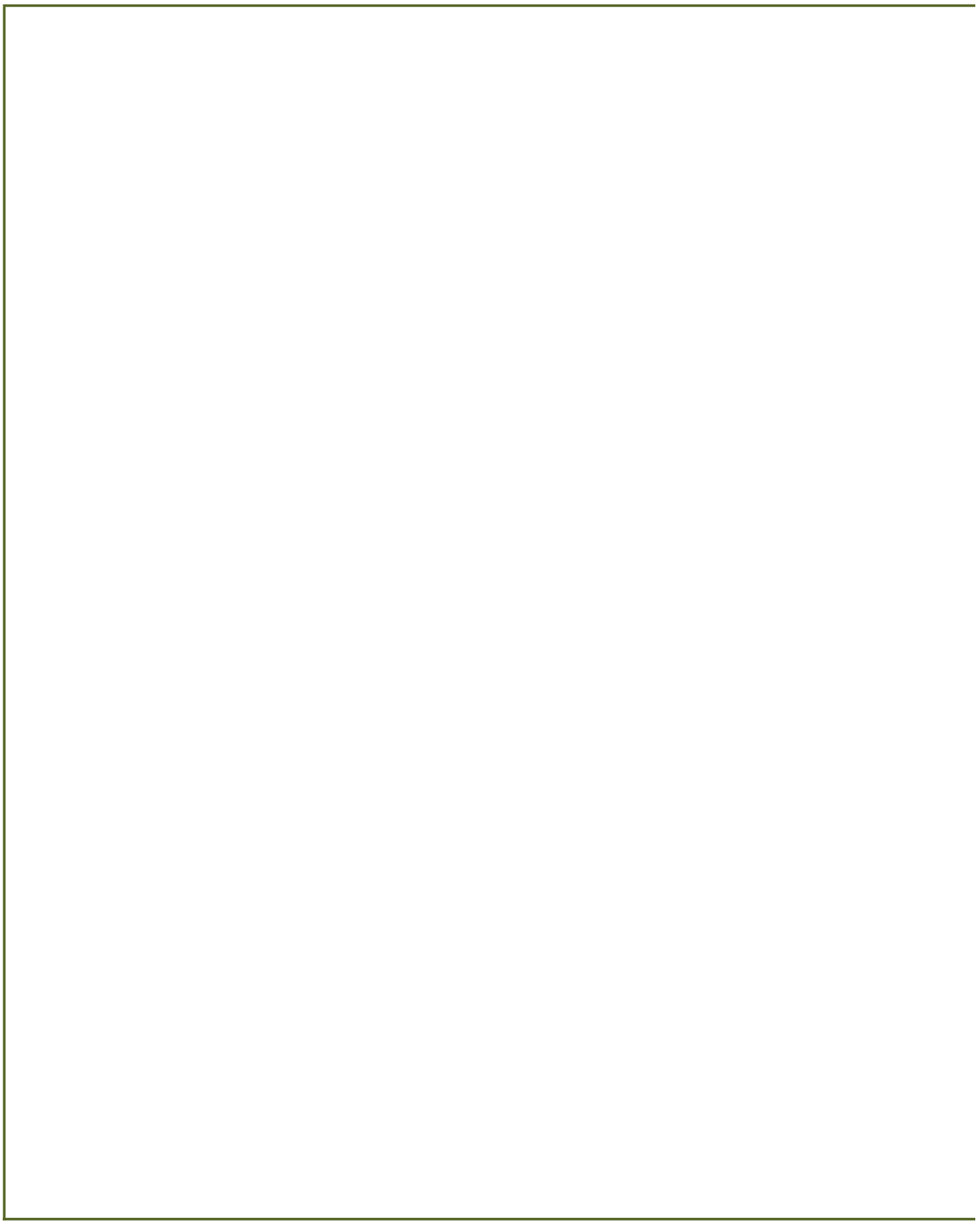

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