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**Evaluation and improvement of integrated cardiac care:
efficient and effective care in patients with chronic
coronary artery disease and chronic heart failure**

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CHAPTER 2

IMPLEMENTATION OF AN INTEGRATED CARE MODEL BETWEEN GENERAL PRACTITIONER AND CARDIOLOGIST: THE SUPPORT CONSULTATION CARDIOLOGY

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ABSTRACT

Objective: Integrated care models have shown to deliver efficient healthcare, but implementation has proven to be difficult. The Support Consultation is an integrated care model, which enables full integration by bundled payment, insurer involvement, pre-defined care pathways and strengthening of primary care. This study aims to provide an indication of the improvements in healthcare delivery after implementation of this proposed model and to create a base for extension to similar interfaces between primary and secondary care.

Design and methods: A retrospective study was used to compare the effect on the number of referred patients with non-acute cardiac complaints and the cost-effectiveness before and after implementation of the Support Consultation. Patients who previously would have been referred to the cardiologist, were now discussed between GP and cardiologist in a primary care setting.

Results: The first consecutive 100 patients (age 55 ± 16 years, male 48%), discussed in the Support Consultation, were analysed. Implementation of the Support Consultation resulted in a net costs (program costs and referral costs) reduction of 61% compared with usual care. All involved parties were positive about the program.

Conclusion: The Support Consultation has the ability to provide more effective healthcare delivery and to reduce net costs. The setting of the current study can be used as an example for other specialties in countries with a similar healthcare system.

INTRODUCTION

Since the last decade, increasing healthcare expenditures have demanded us to look critically at the way we utilize healthcare resources. Despite being able to control a further increase in healthcare expenditures, governments stated that the current healthcare system still lacks efficiency and effectiveness.(1, 2)

Currently, fragmentation characterizes the way healthcare is delivered: a single patient receives care from different healthcare providers and could be referred to different facilities i.e. primary, secondary and tertiary care. The goal of this system is to enable the gatekeeper role, i.e. the general practitioner (GP) only refers those patients with potential underlying cardiac causes to the cardiologist. This should keep the cost down, and give specialized care to those who need it. However, due to limited diagnostic resources and risk averseness of both patient and GP, the threshold to refer patients with a possible cardiac complaint to the cardiologist is low. Research shows that in most cases no cardiac cause of the complaint is found after consultation with the cardiologist.(3-5) One can conclude that healthcare fragmentation hinders communication and collaboration between the healthcare providers and, therefore, is not an efficient way to use healthcare resources. To meet the needs of the patients and, also, provide continuity of care, healthcare ideally should be delivered in an integrated way. (6, 7)

Collaboration between primary and secondary care is a way of integrated healthcare delivery, which has been proven beneficial and more efficient in previous studies. (8-11) An earlier trial has been conducted on integrated collaboration between primary care and cardiology, which resulted in more accurate referrals.(12) In this trial, patients were randomly assigned to joint consultation or to usual care. A total of 49 GPs with 13 cardiologists participated in monthly joint consultations. Comparing joint consultation with usual care, fewer patients were referred and patients underwent fewer diagnostic procedures. Another similar model was implemented in the region of Utrecht (the Netherlands) in 2009. (13) A total of 72 patients were seen by an internist, pulmonologist, orthopedist or ophthalmologist in a primary care setting. Compared to the control group, a reduction of 53% referred patients to secondary care was seen after the one-year follow-up. Despite the promising results of these trials, similar care models have not been implemented on a broad scale in healthcare systems. A possible cause for the lack of widespread adoption is the singular nature of these studies. Therefore, we developed and implemented an integrated care model: The Support Consultation. This study aims to provide an indication of the improvements in healthcare delivery after implementation of this integrated care model for cardiology. Furthermore, it aims to provide and to create a base for implementation of this integrated care model for similar interfaces between primary care and secondary care.

METHODS

Concerning parties

All Dutch citizens are covered by basic mandatory insurance for GP consultations, therefore patients are not charged for consulting a GP. This stimulates the gatekeeping role of the GP. This doctor-patient relationship plays a central role in healthcare provision in the Netherlands and numerous other western countries.

The program took place in the city of the Hague, the Netherlands. The Support Consultation was developed by four cardiologists of the Haaglanden Medical Center (HMC), six surrounding primary care facilities, and the regional health insurer. The six primary care facilities were responsible for 8% of the cardiac referrals to the HMC. Each primary care practice employed 1 to 11 GPs. Close collaboration with a healthcare insurer was a main advantage of the Support Consultation. This resulted in a clear cost focus and a transparent costing of the Support Consultation. To ensure transparent costing, and a cost focus throughout the process, the insurance company paid the GP, and the GP paid the specialist. This clear money path fostered a joint financial incentive.

The Support Consultation

The Support Consultation was implemented in October 2017. Every cardiologist was assigned to 1 or 2 primary care facilities, depending on the schedule of the cardiologist. Patients with a suspected non-acute cardiac complaint, who would usually be referred to secondary care, were now discussed during the Support Consultation. Every four weeks the assigned cardiologist visited the primary care practice, where the registered patients were discussed in a face-to-face setting. We deliberately choose communication in a face-to-face setting because this enables closed-loop communication and mutual trust. These are both cornerstones of effective teamwork. (14) The threshold to discuss doubts and different opinions is lower with familiar colleagues than with strangers. To discuss each patient, 10 minutes were scheduled between GP and cardiologist.

The GP requested additional diagnostic tests according to predefined care pathways. If such tests were necessary, the patient underwent those tests in the hospital before the patient was discussed in the Support Consultation. In this manner, the cardiologists had easy access to the results of the tests and the results were known before the concerning patient was discussed. During the Support Consultation the results of the additional diagnostic tests, the need for referral to secondary care or the need for more diagnostic tests were discussed. A possible outcome was that a patient would be discussed a second time after extra diagnostic tests (resulting from the previous discussion) were performed.

In order to create efficient and effective healthcare delivery, care pathways were designed by GPs and cardiologists. These healthcare pathways were based on the most common cardiac complaints and reasons for referral to secondary care:

1. Chest pain
2. Palpitations
3. Atrial fibrillation
4. Suspected cardiac murmur

The difference between the care pathways 'palpitations' and 'atrial fibrillation' was that patients with palpitations did not have the diagnosis atrial fibrillation whereas patients with atrial fibrillation were known with this arrhythmia and became symptomatic despite treatment. To be sure that the care pathways were well-understood by the different primary care facilities for an efficient referral to secondary care and active re-referral to primary care, cardiologists offered training in the care pathways to each primary care practice before the implementation of the Support Consultation. These care pathways were all in accordance with European guidelines. (15-17) During implementation, it was found that not all patients' complaints fitted the care pathways. This led to the addition of the fifth category 'Other' in the further discussion of the patient.

In collaboration with the Information and Communication Technology (ICT) department a specific electronic tab and treatment code for the Support Consultation was created in the hospitals' electronic patient file. This code enabled the secretary to plan additional diagnostic testing and block sufficient time in the agenda of the cardiologist to visit the concerning primary care practice. Furthermore, during the Support Consultation digital notes could be written down in this tab of the patients' file. With the treatment code in the electronic patient file, it was ensured that the concerning patients underwent the additional tests before the next Support Consultation. Care according to the Support Consultation did not take longer than usual care.

Level of integration

The spectrum of integration within an organization ranges from completely fragmented to full integration of different systems.(18) Full integration exists when professionals collaborate on a personal level in the same organization with a joint financial incentive. (19, 20) The Support Consultation ensured collaboration among primary and secondary care on a personal level through monthly face-to-face communication. The joint financial incentive was ensured because the healthcare insurer reimbursed the GP and the GP subsequently paid the cardiologist: a 'bundled payment'. By these definitions, the Support Consultation is a fully integrated model.

Business case

The developing parties created a business case for the Support Consultation. In this business case, it was assumed that 360 patients per year would be treated. Treating them via usual care would have cost €450 per patient. This was estimated based on data supplied by the healthcare insurer. (Table 1) This €450 included all costs incurred from referral to secondary care, including diagnostic tests. For the Support Consultation, the program costs were established at €112 per patient. This was based on the specialist's fee, the GP's fee, the administrative costs at the hospital and at primary care, the educational hours from the cardiologist and GP and registration costs. (Table 2) The fees from the specialist and GPs were based on an hourly rate. It was assumed that as part of the Support Consultation program, 60% of the treated patients would require additional diagnostic testing, at an average of €194 per patient (based on financial diagnosis codes for low complex additional testing). It was also assumed that 40% of the patients treated via the Support Consultation would be referred to secondary care, at €450 per patient. The per-patient cost for the Support Consultation was estimated to be $(40\% \cdot 450 + 60\% \cdot 194 + 112 =)$ €408, corresponding to a saving of 10%.

Table 1. Overview of used declaration codes and diagnosis codes of 2017

Diagnosis code and description	Declaration codes	Product	Description
101 No cardiac pathologies	15E316	099599004	No indications for cardiac pathology, ambulatory
	15E318	099599011	No indications for cardiac pathology, light ambulatory
201 Thoracic complaints	15E311	099499016	Cardiology, Thoracic complaints, ambulatory
	15E313	099499022	Cardiology, Thoracic complaints, light ambulatory
202 Angina pectoris, stable	15A610	099499015	Cardiology, ischemic without injury, ambulatory
	15A611	099499019	Cardiology, ischemic without injury, light ambulatory
401 Atrial fibrillation, flutter	15A779	099899063	Cardiology, supraventricular rhythms, ambulatory
	17A786	099899072	Cardiology, supraventricular rhythms, light ambulatory
402 Other supraventricular arrhythmias	15A779	099899063	Cardiology, supraventricular rhythms, ambulatory
	15A786	099899072	Cardiology, supraventricular rhythms, light ambulatory

Table 2. Costs Support Consultation

Declaration parts of Support Consultation	Costs
Specialists fee (based on an hourly rate) €140	€47
General practitioners fee (based on an hourly rate) €100	€33
Administrative costs hospital	€12
Administrative costs general practitioner	€8
Hours of education cardiologist and general practitioner	€4
Registration costs	€8
In total per consultation *	€112

Study design and data collection

This paper presents a pre- and post-implementation study of real-life data which was retrospectively analyzed. Included were the first 100 consecutive patients who were discussed according to the Support Consultation. Firstly, baseline characteristics were collected from the electronic records from the moment of the Support Consultation. Baseline characteristics included gender, age, cardiac risk factors and reason for referral according to the established care pathways. Secondly, the performed diagnostic tests, the amount and costs, and final diagnosis were evaluated from the electronic patients' records. (Table 3)

During a follow-up period of 5 months, the number of patients that were referred to the cardiologist, the number of cardiac events and mortality were noted. A cardiac event was defined as a myocardial infarction or another unexpected admission due to a cardiac cause. The realized costs of the patients of the Support Consultation were compared with the estimated costs of usual care in which patients would have been referred to the cardiologist without any other form of consultation. Afterward, a questionnaire was administered to the GPs and cardiologists in order to evaluate the satisfaction of the Support Consultation after implementation. This questionnaire contained 13 questions of which the answer options were positive or negative or a rating from 1 to 10, with 1 related to the lowest level of agreement whereas 10 was the highest level agreement. This study was approved by the Haaglanden Medisch Centrum (HMC).

Table 3. Costs of additional diagnostic testing

Diagnostic test	Costs
ECG	€43.49
Chest X-ray	€38.55
Exercise test	€112.88
Holter monitor	€134.42
Cardiac ultrasound	€81.83
Cardiac CT scan + calcium score	€127.90

ECG = Electrocardiography; CT scan = Cardiac Computed Tomography

Analysis

Continuous variables are expressed as mean $\pm$ standard deviation when normally distributed. Categorical data are presented as frequencies and percentages. Statistical analysis was performed using SPSS for Windows (version 23.0 IBM, Armonk, NY, USA).

RESULTS

Patients

Between October 2017 and February 2018, a total of 100 consecutive patients were discussed in the Support Consultation. Table 4 shows the distribution of the discussed patients per primary care practice, GP and cardiologist. There was a large spread of Support Consultation referrals per GP. There has been no further investigation for this reason. Of the four cardiologists, two were assigned to two primary care practices and discussed respectively 32% and 33% of the patients. The two cardiologists who were assigned to one primary care practice discussed respectively 24% and 11% of the patients. The baseline characteristics of this group have been summarised in Table 5. The mean age was 55 ($\pm$ SD 16) years and almost half of the population was male (48%). Based on the patients' complaint the care pathways were followed: Chest pain (n=39), Palpitations (n=31), Cardiac murmur (n=7), Atrial fibrillation (n=2) and Other (n=21). 'Other' included questions about cardiac medication (n=12), dyspnea (n=6) and syncope or dizziness complaints (n=3).

Table 4. The distribution of patients discussed during the Support Consultation per primary care practice, general practitioner and cardiologist

Primary care practice	GP (n)	Cardiologist	Discussed patients (n)	Patients per GP (n)	Total patients per cardiologist (n)
1	7	A	15	2	32
2	11	A	18	2	
3	9	B	32	4	33
4	3	B	7	2	
5	4	C	24	6	24
6	1	D	11	11	11

GP = General practitioner

Table 5. Baseline characteristics

	Total N=100	Chest pain N=39	Palpitations N=31	Cardiac murmur N=7	Atrial fibrillation N=2	Other N=21
Age (year)	55±16	55±9	48±18	53±22	72±5	65±15
Male, n (%)	48	22 (56%)	13 (42%)	1 (14%)	1 (50%)	11 (52%)
History, n (%)						
HT	31	12 (31%)	6 (19%)	3 (43%)	2 (100%)	8 (38%)
HC	13	9 (23%)	1 (3%)	0 (0%)	1 (50%)	2 (10%)
DM	19	9 (23%)	3 (9%)	1 (14%)	1 (50%)	5 (24%)
CVA	4	2 (5%)	0 (0%)	0 (0%)	0 (0%)	2 (10%)
SBP (mmHg, ±SD)	136±18	135±17	133±18	130±7	140	143±23
DBP (mmHg, ±SD)	78±11	79±11	77±9	74±9	80	78±17

HT = Hypertension; HC = Hypercholesterolemia, DM = Diabetes Mellitus; CVA = Cerebrovascular Accident; SBP = Systolic blood pressure; DBP = Diastolic blood pressure

Additional diagnostics

Table 6 shows the number of referred patients and the performed additional diagnostics tests including the corresponding costs per diagnosis. The performed additional diagnostics testing contained: Electrocardiography (n=29), chest X-ray (n=1), cardiac exercise test (n=11), holter monitoring (n=13), cardiac ultrasound (n=21), cardiac Computed Tomography (CT) scan with calcium-score (n=11).

Table 6. The number of patients per diagnosis and additional diagnostic tests per diagnosis with the corresponding costs

N=100	Total	Chest pain (N=39)	Palpitations (N=31)	Cardiac Murmur (N=7)	Atrial fibrillation (N=2)	Other (N=21)	Costs
ECG	29	12	12	2	0	3	€1.261,21
Chest X-ray	1	0	0	1	0	0	€38,55
Exercise test	11	9	1	0	0	1	€1.241,68
Holter monitor	13	0	11	1	0	1	€1.747,64
Cardiac ultrasound	21	3	4	6	2	6	€1.718,43
Cardiac CT scan + calcium score	11	10	0	0	0	1	€1.406,90
Total costs additional testing							€7.414,41
Referred to secondary care	13	6	2	3	0	2	

ECG = Electrocardiography; CT scan = Computed Tomography

Follow-up

After discussion in the Support Consultation, a total of 13 (13%) patients were referred to secondary care. (Figure 1) Of those 13 patients, 8 patients received a cardiac diagnosis. For 87 (87%) patients who were discussed in the Support Consultation referral to secondary care was not necessary. During a follow-up period of 5 months, a total of 7 patients of this group still needed to be referred to secondary care. Of these 7 patients, one patient had an acute myocardial infarction. The severity of this event warranted a further investigation into the diagnostic course for this patient. After the Support Consultation, this particular patient was referred to the cardiologist to perform a cardiac CT scan with calcium-score for cardiovascular risk assessment. Due to a low calcium-score (25), it was decided that follow-up of this patient by a cardiologist was not indicated. Primary prevention according to cardiovascular risk management seemed the best treatment.(21) Unfortunately, despite the low indicated risk, this patient had an acute myocardial infarction 6 weeks after the Support Consultation. Of the remaining 6 patients with persistent chest pain complaints, one other patient was diagnosed with a cardiac cause. During follow-up, no patients died.

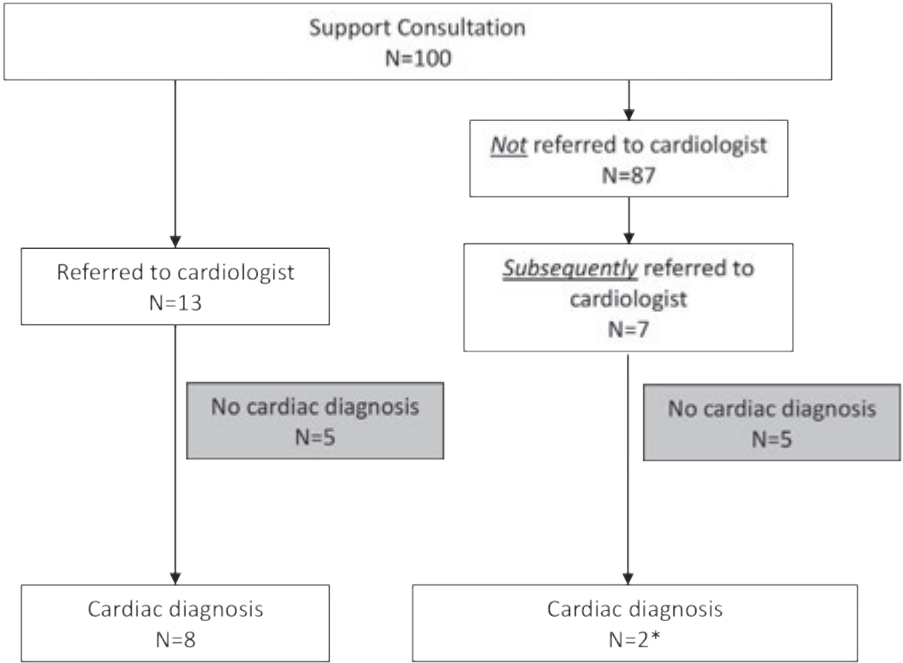


Figure 1. Flow chart of the outcome after implementation of the Support Consultation at 5 months follow-up.* Including acute myocardial Infarction (n=1)

Costs

The total program costs of the Support Consultation are shown in Table 7. The costs were broken down in program costs (€11,233), referral costs (€5,837), and additional diagnostic costs (€7,414). The total costs for the Support Consultation were €24,484, or €245 per patient. The program costs and referral costs together can be thought of as the 'net costs'. Considering just these net costs, the Support Consultation costed €17,069. If the patients would have been treated via usual care, the referral costs would have been €44,897. The program costs are not applicable, and the additional diagnostic costs for the usual care cannot be determined due to the nature of the study. Therefore, it is only possible to compare net costs, with the Support Consultation costing €27,828, or 61% less. Compared to the estimations in the business case, the number of referrals and the money spent for additional diagnostic testing was much lower, leading to much lower costs per patient than initial estimations: €245 realized vs. €408 in the business case model.

Table 7. Costs of usual care compared with the costs after implementation of the Support Consultation

	Usual care		Support Consultation	
Patients (n)	100		100	
Referred to secondary care (n)	100		13	
Program costs Support Consultation	€112 x 0		x 100	€ 11,233,00
Referral costs consultation cardiologist	€449 x 100	€ 44,897,00	x 13	€ 5,836,61
Total net program costs		€ 44,897,00		€ 17,069,00
Difference	€ 27,828			
Savings	61%			
Costs of additional diagnostic testing				€ 7,414,41
Total costs		€ 44,897,00		€ 24,484,02
Difference	€ 20,413,00			

Evaluation

Afterwards, an evaluation took place among GPs and cardiologists, in which all GPs concluded that the Support Consultation was adding value to the primary care practice. The collaboration between the GP and cardiologist was scored an 8.9 out of 10 by the GPs and 9.2 out of 10 by the cardiologists. A total of 90% of the GPs felt confident enough in maintaining the patient in primary care and in carrying out a clear policy to the patient. GPs indicated indirectly that 94% of the patients were reassured and did not feel the need for referral to the cardiologist after the Support Consultation.

DISCUSSION

The results of this study into integrated care delivery for cardiology patients suggest that the Support Consultation is a way of delivering integrated care with the potential to provide more effective healthcare. We believe that this was mainly the result of two important pillars: education in terms of clear care pathways and close collaboration and communication between primary and secondary care.

Implications

The strength of Support Consultation lied in the localization of the specialist in a primary care setting, as this defragmented healthcare delivery. We chose a setting in which the specialist did not see the patient. Consequently, the specialist solely had a coaching role and the GP remained responsible for the healthcare delivery of the patient. Instead of substituting secondary care to a primary care setting, the function of the GP as gatekeeper was strengthened by the advice of the cardiologist. This resulted in fewer referrals to secondary care, which will result in shorter waiting lists in secondary care.

The current study showed a potential net cost reduction of 61% compared with usual care where all patients would have been referred to a cardiologist. On the long term, the total cost savings are likely to be higher than the reported cost savings: the longer the high secondary care costs can be avoided, the higher the cost savings will be. As the experience of GPs will grow, it is likely that fewer patients are referred to secondary care. Due to the Dutch healthcare system, patients are generally faced with extra costs when they are referred to the hospital, or when additional testing is required. Therefore, saving costs in the interface between primary and secondary care directly benefits the patients as well.

We believe the Support Consultation setup facilitates the implementation of integrated care for the following reasons. The full integration is guaranteed by ensuring face to face communication, and the 'bundled payment' and insurer involvement lead to a joint financial incentive. The care pathways help the GP in initial decision making, and also allows the specialist to prepare for the discussion in the Support Consultation. The coaching role of secondary care keeps the aforementioned doctor-patient relationship intact. Also, the separate treatment code allows the indirect organization to enable the Support Consultation. Lastly, all involved parties were positive about the program. The setting of the current study could serve as an example to other specialists, like dermatology or orthopedics, and eventually may be a way to provide efficient healthcare for all suitable patients in Western countries with a similar primary healthcare system (e.g. UK, Denmark, Sweden).

Future perspectives

The annual number of consultations is 68.5 million in the Netherlands. (22) Just chest pain alone is in 0.7-2.7% the reason for consulting a GP, translating to at least 479.500 (0.7%) to 1.849.500 (2.7%) consultations about chest pain. (4) Increasing efficiency in care delivery by integrated care creates opportunities to make a significant impact.

Before the implementation of the Support Consultation, four different care pathways were established to streamline the process for the most common cardiac complaints seen in primary care practices. A significant amount of patients (21%) treated in the Support Consultation were not treated according to a predefined care pathway. A possible explanation could be that the complaints did not fit in the established pathways. In the future, it could be worthwhile to investigate the possibilities to establish extra care pathways, for example a heart failure pathway, and other frequently observed themes.

To extend the Support Consultation we plan to assign a cardiologist for one year to a primary care practice. The learning curve is expected to reach a plateau after one year, with the GPs being experienced enough. Eventually, the setting of the Support Consultation can change into a virtual setting. To maintain the gained knowledge of the GPs and to reduce referrals in the long term, recurrent educational sessions by the cardiologist should be considered. A pro-active approach is needed to ensure the gained knowledge is not lost.

Limitations

Several limitations are acknowledged. Because this is an observational study patients were not randomized to an intervention group or control group. Therefore, the outcomes of this study should be interpreted as an indication of what implementation of the Support Consultation could achieve in effective healthcare delivery. In addition, evaluating the follow-up of the outcome of the patients of the Support Consultation with usual care is difficult as well. To provide an indication of a control group, only relevant patients with a cardiac complaint who would be referred to cardiologists in usual care were discussed during the Support Consultation. We are aware, that it is possible the threshold to discuss patients in the Support Consultation is lower than the threshold to refer patients to a cardiologist. This could result in an overestimation of the effectiveness in preventing a referral and in total cost reduction of the Support Consultation. Nevertheless, this study aims to focus on the possibilities of implementation of collaborated healthcare delivery between a cardiologist and GP in a real-life situation. By giving an indication in cost-effectiveness, it is possible that an underestimation of the total expenditures is noted. On the other hand, even if twice as many patients would have been discussed in the Support Consultation as compared to usual care, the net program cost of the Support Consultation would still be lower (2x€17.069 compared to €44.897). Lastly, the learning effect of the Support

Consultation for the GPs and cardiologists alike was outside the scope of the current study. Further investigation into this learning effect is recommended in future studies.

Conclusion

The Support Consultation has the ability to provide more effective healthcare with potential in net cost reduction of 61%. Based on the realized net cost reduction and the positive responses of all involved parties we believe the principles of the Support Consultation (insurer involvement, empowering primary care, integrated care), can be used for all primary- to secondary care interfaces.

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