74 NRP
Smarter Health Care
National Research Programme

Synthesis Working Paper:
Cost and Reimbursement

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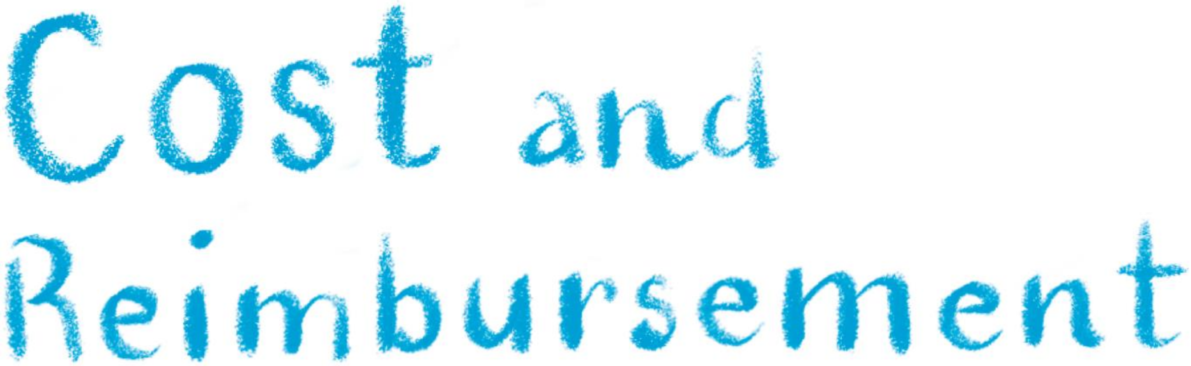

Swiss National
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About this Synthesis Working Paper

The NRP 74: Research for better health care

The National Research Programme "Smarter Health Care" (NRP 74) aims to promote innovative health services in Switzerland and to tackle the practical challenges the health care system is facing today. To this end, researchers are investigating a wide range of aspects, from the better use of health data and the care of older people at home to case management in emergency wards.

The NRP 74 includes 34 research projects at universities and higher education institutions throughout Switzerland. It is implemented by the Swiss National Science Foundation (SNSF) on behalf of the Federal Council, has a budget of CHF 20 million and runs from 2016 to 2022.

Six critical areas with a Synthesis Working Paper for each

To address some of the overarching issues facing the health care system today, the NRP 74 has integrated significant research findings from single projects into six topic-specific syntheses. In these six critical areas, researchers analysed their results from different professional perspectives, putting them in a larger context and devising recommendations to meet the current challenges in today's health care system.

These areas are:

- Quality of care
- Patient participation
- Coordination and care models
- Cost and reimbursement
- Health care data
- Building a strong research community (EHCL+)

All six topic-specific synthesis can be consulted on www.nrp74.ch.

The Synthesis Team

This Synthesis Working Paper on the theme of "Cost and Reimbursement" has been compiled by a team led by a member of the NRP 74 steering committee and comprising a second steering committee member, a principal investigator, and three doctoral students engaged in NRP 74 projects and part of NRP 74's Emerging Health Care Leaders (EHCL) programme:

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Table of Contents

Figures

Tables

Editorial

The Programme Synthesis Working Paper “Cost and Reimbursement” provides a summary of several research projects within the NRP 74 of the SNSF. It is based on an intensive process of summarizing individual project findings, interviewing principal investigators (PIs), incorporating the existing literature as well as reflecting on the findings with key stakeholders of the Swiss health care system. We aim to submit these results and proposed ideas to policymakers with the hope that the findings are helpful to support their efforts in continuously improving the effectiveness and efficiency of the Swiss health care system. It is our belief that an effective and efficient health care system must make the best use of limited resources. This requires that we know the costs of services and interventions as well as the implications of different reimbursement systems.

The findings presented here are in line with the results of various international studies. However, in most cases, it is the first time that the respective research was done in Switzerland and within the Swiss health care system. We are convinced that these findings can contribute to the ongoing policymaking process in this country, but we are also aware that more research on health economics and in particular on cost and reimbursement must follow in order to broaden and strengthen the evidence-base of decision-making. Therefore, we encourage all readers to continue supporting research efforts, financing scientific studies, and reflecting on the findings of evidence-based work.

This Synthesis Working Paper is based on the tremendous work of many colleagues. We would like to thank the PIs for their willingness to share their research results even before publication, for drafting summaries of their findings and for engaging in insightful interviews with us. Furthermore, we strongly appreciate the experts participating in our stakeholder dialogue meeting in June 2021 and sharing their insights with us. Our Synthesis Working Paper strongly profited from their input. Personally, I am very grateful for the dedicated members of the Synthesis Team who invested strong effort in this work. Without Thomas Gächter, Michael Gerfin, Stéphane Praz, Olivia Yip, Flaka Siqeca and Camila Plaza de Laifer, this Synthesis Working Paper would never have been possible. In particular, our three doctoral students and members of the NRP 74 Emerging Health Care Leaders (EHCL) community have carried this work to a very large extent: Olivia, Flaka and Camila contributed to the design, conducted and analysed the interviews, maintained contact with the PIs and drafted several versions of the paper. Their contribution was incredible – and I am confident they also learnt a lot during this process.

Finally, I would like to thank the colleagues from SNSF for their leadership, in particular Manuela Oetterli. The innovative perspective of distilling research projects into a synthesis that is relevant for policymakers is truly unique, and Manuela’s constant motivation inspired the team.

It was an honour to lead this group. We all learnt a lot during the process, and now we humbly submit our findings to the readers so that they can transform scientific evidence into policies with an impact on the quality of life of many people in Switzerland.

Zürich, in January 2022, Prof. Dr. Steffen Flessa

Executive Summary

Deriving policy advice from NRP 74 research

The *Synthesis Working Paper "Cost and Reimbursement"* provides scientifically based recommendations for decision-makers, designed to make the Swiss health care system more efficient. Efficiency in this context means that with the given resources more health for all is achieved.

The recommendations are mainly based on the scientific findings delivered by six projects of the Swiss National Science Foundation's National Research Programme "Smarter Health Care" (NRP 74). These projects represent the part of the NRP 74 that specifically dealt with health economic issues.

The process leading to this working paper was largely driven by doctoral students engaged in NRP 74 projects who are members of the NRP 74's Emerging Health Care Leaders (EHCL) programme. They interviewed researchers, consulted the current literature on the topic and interacted with stakeholders from practice, administration and politics. This Synthesis Working Paper thus bridges education, research and practice, contributing at multiple levels to proactively address some of the major challenges facing Swiss health care.

Background: High - and rising - health expenditure

Switzerland's health care system performs very well in an international comparison: In the Euro Health Consumer Index 2018, the most important comparison for assessing the performance of the national health care systems of 35 countries, Switzerland occupies the top position. However, with an expenditure of over 11 % of GDP (2018), the Swiss health care system is also one of the most expensive in the world. And the costs are rising steadily. While expenditure totalled CHF 58.6 billion in 2004, it had already reached CHF 80.2 billion by 2018. The main reasons for this cost increase include the ageing of the population, which leads to an increase in chronically and multimorbid people, as well as new medical technologies.

A health care system difficult to reform

The central legal basis for the health system in Switzerland is the Health and Accident Insurance Act (KVG). It stipulates that all persons living in Switzerland must belong to a health insurance fund, which ensures their basic medical care. It also regulates many other areas of the health system. Since its introduction in 1996, the KVG has undergone several revisions. However, several major reform projects initiated by the federal government to reduce costs have failed. Most recently, this was the case with the intended mandatory introduction of integrated care models. This so-called "Managed Care Bill" was rejected in a federal referendum in 2012.

The introduction of a new tariff system (TARDOC) in primary care has been dragging on for several years without a breakthrough so far. And while the current KVG reform project of the Federal Council, which consists of two packages of measures to contain costs, is receiving approval from key actors and many stakeholders in some points, it is becoming apparent that there still is a lot of disagreement on how to proceed concretely.

The contribution of health economics: Getting the most out of the given resources

One constant in the political debate is also central to research: Costs should be reduced wherever possible, while at the same time the quality of medical care should be guaranteed at least at the existing level. This means that access to primary health care will continue to be open to all persons residing in Switzerland, regardless of their age or medical history.

In order to be able to guarantee this, the health system or individual parts of it must be designed more efficiently than before. This is precisely where health economics comes in: it analyses procedures and processes in the health system and tests new approaches with the aim of enabling a more efficient use of resources. Coordination issues play a major role here, for example between different providers, as this is a point where there are often major, cost-generating inefficiencies. Another central issue is reimbursement, i.e. the principles according to which health insurance funds, cantons and the federal government pay for the services of health care providers.

The contribution of NRP 74: Evidence for Switzerland

In view of the complex interrelationships in the Swiss health care system, it is hardly possible to assess the entire system in terms of its efficiency potential. However, research can provide evidence in limited areas and thus help guide decision-makers. Studies that analyse real processes in the Swiss health care system have the advantage that they always take the special features of the system as a constitutive framework into account. In this sense, the NRP 74 provides individual pieces of the puzzle that can, however, fill important gaps.

The projects presented in this Synthesis Working Paper dealt with the following topics:

- Effects of GP practice closures on costs
- Effects of fee for service vs. capitation reimbursement systems on physicians' service provision
- How financial incentives influence GPs treatment of diabetes
- Costs related to poor continuity of care for chronic patients
- Role of gatekeeping
- The role of participatory medicine to improve quality of colorectal cancer screening
- Cost-effectiveness of a mental health treatment delivered at home

Conclusion: Four broad recommendations to advance health care in Switzerland

The *Synthesis Working Paper "Cost and Reimbursement"* results in four broad recommendations, each of which is further sharpened and divided into several sub-recommendations. These target different levels of interaction intrinsic to the overall system: the policy level (e.g. regarding legislation), the management level (e.g. organisation of processes within institutions) and at the level of personal interaction between service providers and patients.

1. Coordinated and integrated care should be strengthened.

On the policy level

- Strengthen networks of physicians and other service providers.
- Improve the continuity of care after the retirement of physicians by means of careful strategic planning by physician associations.
- Continuity of care, coordination and integration should be sufficiently financed, i.e., the reimbursement of coordination and integration services should not be lower than for other medical functions.

On the management level

- Physicians should plan their retirement strategically to ensure the continuity of care for their patients.
- Avoid double diagnostics through improved information transfer and digital platforms.

On the personal interaction level

- Physicians should provide consultancy on continuation of care to their patients.
- Retiring physicians must inform their patients, especially the chronically ill, about the importance of the continuity of care and recommend suitable replacements.

2. Gatekeeping should be enhanced.

On the policy level

- Efforts to improve the role of gatekeeping in mandatory health insurance should be supported.
- The number of physicians in each canton should be actively regulated.
- The geographic distribution of physicians should be strategically planned.
- The gatekeeper function should be sufficiently financed, i.e., the reimbursement of exerting a gatekeeper function should not be lower than for other medical functions.

On the management level

- The importance and attractiveness of primary care among young physicians and students of medicine should be strengthened.
- Training of physicians should prepare medical students for their role as gatekeepers.

On the personal interaction level

- Physicians must actively exert their role as gatekeepers.

3. Efforts to improve the quality of health care services should be supported.

On the policy level

- Efforts to improve quality of care and patient safety should be strengthened and sufficiently financed.
- National standards of quality of care should be developed and introduced.
- Tariff-based incentives for high-quality treatments should be introduced if complemented with other quality measures.

On the management level

- Quality indicators should be defined and implemented on all levels of health care.
- Quality must be realized as an essential dimension of health care and as a determinant of cost and reimbursement.
- Clinical routine data must be available electronically.

On the personal interaction level

- The individual and subjective quality of care must be at the centre of physician-patient-interaction in order to avoid unnecessary and dangerous diagnostics without realizing the underlying problem of the patient.
- Participatory physician-patient decision-making must be supported to help improve care quality in primary care practices.

4. The reimbursement system should be reformed.

On the policy level

- Given that the reimbursement system is a central cornerstone of the entire health care system, tariffs should be analysed and re-regulated regularly.
- Selective contracting between health insurers and care providers should be explored in the Swiss context.
- Pay-for-performance should be further piloted in various settings and the results should be analysed to confirm their relevance for Switzerland.

On the management level

- Overtreatment could be reduced by mixed tariffs including flat-rate elements in ambulatory care, in particular for chronically ill patients.

On the personal interaction level

- Free contracting between health insurances and health care providers should be allowed.

1. Introduction: Efficiency – Making the best of health care resources

Summary

This chapter introduces the basic economic principles health care systems have to operate under. These are founded on the observation that health care services are provided under the condition of limited resources, e.g., budgets, personnel and materials are scarce and require rational decisions to make the best use of them.

Health economics enable a more efficient use of resources

A key factor influencing the delivery of health care is the way the financing and reimbursement of services is organized. Depending on the situation, different incentives are set for both patients and providers, which can lead to resources not being used optimally in the interest of the entire system.

This is exactly where health economics comes in: it analyses procedures and processes in the health care system and tests new approaches with the aim of enabling a more efficient use of resources. Efficiency in this sense means that either the same performance is achieved with fewer resources, or a better performance is achieved with the given resources.

The decisive outcome is health

The decisive outcome is therefore: health. Health, which can be expressed by different indicators, such as (healthy) life years, quality of life or individual well-being. Thus, an economic analysis is not an end in itself, but serves the purpose of providing evidence of how the health of all members of society can be improved with limited resources.

1.1 Health care services are provided under the condition of limited resources

Dignity is a fundamental right of all human beings which must be respected and protected (Art. 7, Constitution). However, human dignity can be infringed upon by poor health and diseases. Thus, the provision of preventive, curative and palliative health care services as well as health promotion are grounded into our fundamental rights and values (see also Art. 117a, Constitution).

Unfortunately, health care services are provided under the condition of limited resources, e.g., budgets, personnel and materials are scarce and require rational decisions to make the best use of them. In order to protect the dignity of citizens and in order to achieve the respective constitutional goals, politicians, health care providers and all other decision-makers must find ways to avoid the waste of scarce resources and use them efficiently, while balancing the competing demands in health care.

1.2 Economics provides tools to identify inefficiencies

Economics provides a framework and tools to define efficiency and to identify inefficiencies. This allows to analyse systems with respect to their efficiency and to recommend measures for improvement. The underlying questions are : “How can a given output be produced with minimal costs?”, or “How to use given resources in the most efficient way, e.g. in order to maximize the welfare of society?” The opposite of efficiency is the waste of resources, which is seen as unethical as any wasted resource cannot be used to produce meaningful outcomes for individuals and society.

In order to analyse the efficiency and propose an efficient system, decision-makers must know the outcomes which are produced and the resources consumed to produce them, i.e., decisions must be based on economic evidence. The value of the latter can be easily expressed in costs as the financial value of the resources, while the outcomes are frequently multidimensional and cannot be standardized easily.

Health economics provides the foundation for designing and running an efficient health care system. The outcome of a health care system is – in principle – health, which can be expressed by different indicators, such as (healthy) life years, quality of life or individual satisfaction, where the denominator is the cost. Consequently, any analysis of the efficiency of a health care system will start with an analysis of costs. In other words: what resources are consumed to produce the health care services and the resulting health of people and what is the financial value of the resources consumed to produce the services?

1.3 Costs are to fall, while quality of care is to be maintained

An improvement of the outcomes can be achieved in three ways: first, we can increase the health care resources. Secondly, we can improve the technical efficiency, i.e., organize the production of health care services more efficiently so that no resources are wasted in health care institutions, which falls under the domain of health business research. Thirdly, we can improve the allocative efficiency, i.e., design health care systems in a way that resources are utilized where they produce the best results. We must design reimbursement systems such that health services are produced by the most efficient health care provider. For instance, a reimbursement system must encourage the provision of pre-defined services by the least expensive provider at a given quality; furthermore, it must guarantee that preventive services are fostered, and innovations are promoted.

1.4 Gaining evidence for improving health with limited resources

Consequently, a health economic analysis should always start with an overview of the costs of health care services and the reimbursement system. This includes the estimation of behavioural parameters in order to understand incentives. Based on this analysis, it should provide recommendations on how to improve the reimbursement system and forecast the consequences of respective changes on the cost and efficiency of the system. An economic analysis is not an end in itself, but serves the purpose to provide evidence for improving the health of all members of society with limited resources.

2. Cost and reimbursement in the Swiss health care system

Summary

This chapter briefly explains the special way in which the Swiss health care system works.

A system of “managed competition”

Switzerland guarantees comprehensive medical care to all of its 8.5 million inhabitants. Private insurers are obliged to offer the same basic care to every-one, regardless of age and medical history. However, they are free to offer different plans, e.g. reduced premiums for people opting for a managed care model. For all residents, on the other hand, the choice of basic insurance with one provider is mandatory. This system can broadly be described as managed competition.

Fee-for-service in outpatient care, flat rate per case in inpatient care

The reimbursement system consists of two main elements: a fee-for-service (FFS) system for independent medical practices (general practitioners and specialists) in the outpatient sector and for outpatient care in hospitals, called Tarmed, and a prospective system based on Diagnosis Related Groups (SwissDRG) for the inpatient sector.

More efficiency would be possible, but reforms are difficult

The Swiss health care system provides very good services - especially in international comparison - but is also expensive at the same time. There are indications that the same quality could be achieved at lower cost, which is considered urgent in view of the generally rising health care costs.

But the complex design of the system makes reforms difficult. This is exemplified by the fact that for years there has been little progress on a major reform of Tarmed, the reimbursement system for outpatient services.

2.1 Brief overview of the Swiss health care system

2.1.1 A high-quality health care system that has its price

The Swiss health care system is highly complex and characterized by its managed competition model as well as the sharing and fragmentation of its decision-making powers. Currently, Switzerland is ranked fourth among Organization for Economic Cooperation and Development (OECD) countries in terms of health care expenditures relative to GDP. Regarding quality Switzerland performs very well, being the best performer within Europe in terms of life expectancy and amenable mortality and among the best in many other measures such as Acute Myocardial Infarction (AMI) mortality or access to care (OECD, 2019).

However, there is some evidence that the same quality could be achieved at lower costs. As De Pietro et al (De Pietro et al., 2015) state, a host of factors including: provider density, payment mechanisms, population demographics, as well as supply induced demand, subsidized hospital investments and fragmentation of provision, can lead to an inefficient use of resources (Brunner et al., 2019).

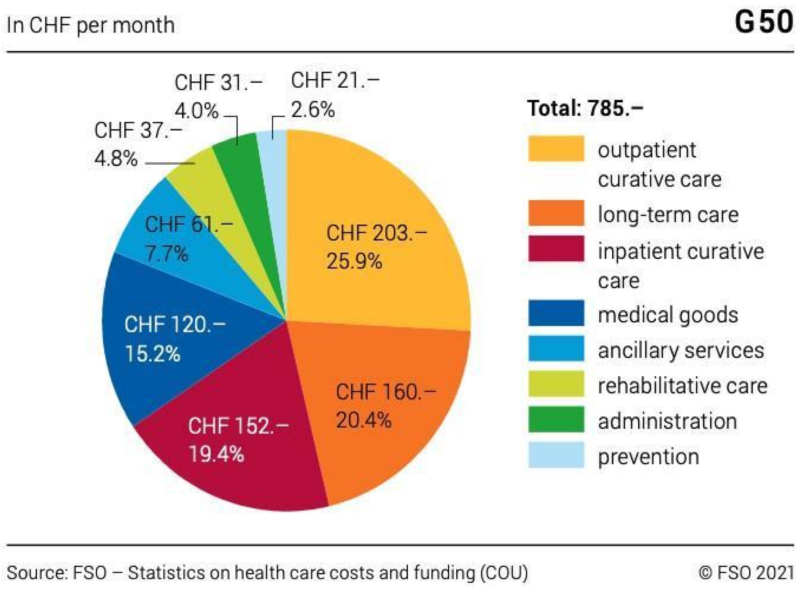
As shown in Figure 1 health care expenditure per capita in 2018 amounted to CHF 785, a sharp increase in comparison to the CHF 320 spent per capita in 1990. Outpatient curative care has the largest share with over 25% of health expenditure in 2018. Both inpatient curative care and long term care amount to approximately 20% of the costs, and medical goods (mostly drugs) account for roughly 15%. Taken together, 80% of all health care expenditure is spent in one of these four categories.

2.1.2 Mixed financing with a comparatively large out-of-pocket share

On the financing side, about 30% is coming from the public sector, mostly the cantons. 20% of these payments are health insurance premium subsidies for low-income households. The rest almost entirely finances the in-patient sector. Households pay 66% of the health care spending, either through insurance premiums (38%) or out-of-pocket payments (28%). This fraction of out-of-pocket payments is very large compared to other European counties.

The governmental role in this health care system is divided across the federal, cantonal, and municipal levels who are responsible for licensing providers, coordinating hospital services, and subsidizing institutions and organizations. In the following section, an overview of the health service provision, the financing of the system, as well as the costs and reimbursement systems in Switzerland will be explained. The Swiss cantons are responsible for the provision of health care services and co-finance hospital care (funded via taxes). Private health insurance companies also co-finance the inpatient services. As per the law of Swiss Federal of Health Insurance (KVG), cantons must directly pay 55% of the eligible costs of public or publicly subsidized private hospitals. This is paid by means of global budget systems and (partially) covers generated deficits at the end of the financial year. The rest is received by the funding from insurers. As Beck et al. (Beck et al., 2020) explain, cantons continue to pay directly at least 55% of the costs of inpatient hospital care.

Figure 1: Health expenditures per capita in 2018



2.2 Health insurance in Switzerland

2.2.1 Basic health insurance is mandatory

Since the 1996 reform of the Swiss health insurance law, basic health insurance is mandatory for all people living or working in Switzerland. Mandatory health insurance (MHI) offers a comprehensive coverage of medical services, medical products, pharmaceuticals, as well as other health care services, e.g. physiotherapy and long term care. This system can be broadly characterized as managed competition (Beck et al., 2020). Health insurance coverage is offered by approximately 50 different private insurance companies, which are not allowed to make profits on mandatory health insurance and compete in a strongly regulated market. As per the law, insurers are mandated to accept all individuals which enrol.

2.2.2 Different plans nevertheless allow (strictly regulated) competition between providers

Furthermore, neither employers nor government agencies can pre-select insurance plans for individuals. Every resident of Switzerland can thus choose for themselves both his or her health insurance company as well as the insurance plan[1] (free choice of physician or a managed care model) and deductible level (which ranges from the mandatory CHF 300 to CHF 2'500 per year). As contracts have a one-year duration, the individual can switch insurance companies as well as insurance models and deductible level by the end of November each year. Furthermore, individuals can voluntarily select complementary health insurance and supplementary health insurance. As the research addressed in this Synthesis Working Paper as well as recent proposals by the Federal Council have focused primarily on MHI, for the purpose of this synthesis we will also focus solely on MHI.

2.3 Cost and reimbursement schemes

2.3.1 Different schemes can affect behaviour of health care providers

Reimbursement schemes not only define the way health care services are paid for, but also can affect the behaviour of health care providers, in turn having consequences on quality of services, efficiency and costs. The reimbursement system in Switzerland comprises of two main elements: a fee for service system (FFS) for independent physician practices (general practitioners and specialists) in the outpatient sector and ambulatory care in hospitals called Tarmed and a prospective system based on Diagnosis Related Groups (The SwissDRG) for the inpatient sector.

Tarmed, or Tariffe Medique, was created in 2004 to classify and assign a monetary value to all services provided by health care workers of the outpatient sector (De Pietro et al., 2015, Gährer and Scherrer, 2014). With over 4700 services, the system allots an estimated amount of technical and physician time, as well as the monetary value of each service provided. [2] The system ensures that physicians bill the

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[1] There are three types of gatekeeping models withing the managed care plans: preferred-provider organizations (PPO) in which the general practitioner (GP) is the gatekeeper, health maintenance organizations (HMO) where a group practice or a physician network are the first instance of care, or a call centre also referred to as telemedicine (TelMed).

[2] For more details concerning how the monetary values are derived, refer to De Pietro et al., 2015 and Gähler and Scherrer, 2014

same amount for a service within a canton (FMH, 2014). Moreover, this fee schedule is collectively bargained between the providers' and insurers' associations.

2.3.2 Stalled revision of the fee for service reimbursement system in ambulatory care

By 2013, one of the critiques levied on this classification system was that it heavily rewarded technical services above labour intensive services (De Pietro et al., 2015) with a revision of the TARMED system following in October 2014. The reform sought to tackle the difference in income of the aforementioned physician groups by introducing a consultation bonus billable by GPs and paediatricians and a decrease in the fees of highly technical chapters.

A later revision of 2018 sought, among other goals, an adjustment of the allotted time for services such as CTs and MRI, a decrease in the corresponding minutes of selected services, and billing limits for electronically billing specialists (FMH, 2017).By July 2019, TARDOC - a complete overhaul of the TARMED system – was unanimously approved as the new outpatient tariff structure by curafutura[3]. TARDOC was meant to reflect the current technical and technological possibilities available to physicians. However, this initiative was not approved in its present form by the federal council in June 2021.

2.3.3 A system with flat rates per case in the inpatient sector

As previously mentioned, a substantial part of the national health care budget in Switzerland is spent on inpatient care. The DRG is the main reimbursement system for inpatient care. Under this system, each hospital case is allocated to diagnosis related groups based on specific criteria. Each DRG is then paid a flat amount, calculated by multiplying a base rate by a cost weight. Although the DRG system had already been introduced in selected cantons, it was not until 2012 that it was implemented at the national level[4]. This reform also introduced free movement of patients between cantons, which reduced cantonal fragmentation (Mossialos et al., 2016). The non-profit corporation SwissDRG AG is responsible for defining, developing, and adapting the national system of relative cost weights per case, and was introduced as a means to contain hospital costs.

2.3.4 All in all, the system is highly complex and fragmented

In conclusion, the Swiss cost and reimbursement system is highly complex – as it combines not only aspects of managed competition and corporatism (Pietro et al. 2015), but furthermore on state regulation, with the federal system also leading to cantonal differences. In light of the increasing health expenditures, the complexity of the reimbursement system, as well as the critiques levied on the system as a whole, we next present the challenges faced within the Swiss health care system, the drivers of costs, and the current strategies to overcome these.

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[3] Curafutura: Association of the health insurers CSS, Sanitas, Helsana, and KPT.

[4] For an overview of the payment systems prior to the reform, refer to the study of Meyer (2015).

3. Current challenges – and strategies to overcome them

Summary

This chapter describes specific factors driving costs in the Swiss health care system, the challenges with regard to improving efficiency at the system level and which solutions are proposed to this end.

Mainfold reasons for the rise in costs

The costs of the Swiss health care system have been rising for years. The main reasons include the ageing of the population, which leads to an increase in chronically and multimorbid persons, as well as to the development of new medical technologies. Among other things this includes the ever-increasing number of inpatient visits, and the rising costs per consultation for medical treatment in practices.

... as well as for inefficiencies

There are also many factors explaining the inefficiencies that can be observed. One reason cited in the scientific literature is the shared financing of care between cantons and insurers. The fact that there are also large differences in health expenditure between the cantons points to additional factors, such as provider density, payment mechanisms and population demographics.

Major reforms are having a hard time

Even though smaller reforms are quite common in Switzerland and are rarely reversed once introduced, major reform projects have had a hard time in recent years. One reason is that in the case of conflicting interests, joint decision-making renders consensus difficult.

The “Expert Report”: A comprehensive catalogue of measures to curb health care costs

In early 2017, the Federal Department of Home Affairs (FDHA) commissioned a group of Swiss and international experts to propose measures to curb cost growth in the Swiss health care system. Their findings were presented in a report referred to as the "Expert Report" in this document.

The Expert Report proposes short- and medium-term measures - and a long-term reorientation of the health care system. It combines existing and new approaches, 38 in total, 20 of which are considered to be of particular priorities. The Expert Report has become a key policy document and has largely influenced the Federal Council's health policy strategy 2020-2030 (Health2030).

3.1 Drivers of costs

3.1.1 More inpatient visits, costlier consultations in ambulant care, high drug prices

In Switzerland, around 80% of costs are incurred within the four areas of the MHI: 1. Inpatient sector treatment; 2. Physician treatment in private practices; 3. Hospital-ambulatory sector treatment and 4. Pharmaceuticals (Bundesamt für Gesundheit, 2017). To expand on the first category of costs, there has been an increase in the number of inpatient visits, despite that per-case flat rates as of 2012 had attempted to curb costs in this area.

Next, for physician treatment in private practices, the cost per consultations has risen but the number of consultations has stayed the same. Particularly notable is that more specialists, who generally bill more expensive treatments and procedures, are consulted instead of general practitioners. With respect to treatments in the hospital-ambulatory sector, there has been a steep incline in the number of consultations since 2010, though the cost rate has remained the same.

Finally, Switzerland's prices of pharmaceuticals appear to be twice as high in comparison to other countries in Europe. However, the pharmaceutical aspect will not be expanded on, as it is not a focus of this report. Aside from these four largest cost blocks of the MHI, smaller cost groups (physiotherapy, outpatient care, laboratory analyses) currently also incur high costs (Bundesamt für Gesundheit, 2017).

3.1.2 Large differences in health care expenditures between cantons

The per-capita health care expenditures range widely between the cantons, which as suspected in the World Health Organization's Health Systems in Transition (HiT) report on Switzerland, could be linked to factors such as : 'provider density, payment mechanisms, population demographics, and urbanity and per capita income'(De Pietro et al., 2015). More specifically, "supplier-induced demand" (i.e., when the physician influences a patient's demand for care against the physician's interpretation of the best interest of the patient) has been identified as an additional potential driver of the costs, attributed to the incentive structures within fee-for-service reimbursement, 'subsidized hospital investments', as well as fragmented care.

3.1.3 Shared financing of care between cantons and insurers affects efficiency

With respect to the financial incentives, one inefficiency noted is the shared financing of inpatient care between the MHI companies and the cantons. As elaborated by Beck et al. (Beck et al., 2020) this, in turn, may improve the efficiency of the health insurance market by relieving insurers from some of the risks associated with hospitalized individuals who tend to incur in higher costs. However, the authors argue that a subsidy for inpatient care (excluding outpatient care) may distort choices for the site of care. Thus, an inefficiency is introduced as outpatient care is less costly than inpatient care (Beck et al., 2020).

Meanwhile, to help compensate for their investments in certain infrastructure which may otherwise be underused, the cantonal hospitals may be encouraged to provide ambulatory care services that are covered by MHI. In this regard, inefficiencies within the system where there may be unnecessary or low-value care are an ideal focal point to address moving forward.

3.2 Challenges within the system

3.2.1 With conflicting interests, shared decision-making complicates consensus

Critiques on the Swiss health system highlight many challenges. One could consider the challenges resulting from the broad, organizational level, due to shared decision-making roles across three different levels of government, the associations representing health-related bodies (e.g., the associations of health insurers or providers), and the residents of Switzerland, who can also play quite an active role (De Pietro et al., 2015). For example, there may be conflicting goals and priorities between the associations which are involved in the negotiation of contracts and tariffs for reimbursing services (Swiss Academy of Medical Sciences, 2019). Naturally, this makes it difficult to reach consensus on new measures between the multiple parties.

3.2.2 Little use is made of some internationally established measures

System level cost-containment measures such as global budgeting have been used in several OECD countries (Wolfe and Moran, 1993). However, according to the HiT Report in Switzerland, neither global budgets nor monitoring (by MHI companies or cantons) are common practice in attempting to control the costs incurred by ambulatory and inpatient care (De Pietro et al., 2015). Additionally, they report that health technology assessments (HTAs) are underused (De Pietro et al., 2015); a tool which could help ensure that the medical services and technologies are continually reviewed to ensure the ones funded are indeed the most beneficial. Likewise, improved use of medical guidelines to support health care professionals in decision-making could help control the variety in expenditures between the cantons.

3.2.3 A lack of data prevents clear decision-making

Moreover, it does not look as if sufficient mechanisms to encourage that “appropriate quantities of health services” are used, aside from some managed care contracts (OECD/WHO, 2011). The health system has also been quoted as “flying blind”, lacking the much-needed data on quality of care and health inequities (Swiss Academy of Medical Sciences, 2019). Health care data is not harmonized in Switzerland, creating additional challenges for researchers as medication data, insurance data and hospital data are all separate instead of linked, and both outpatient and hospitals have varying software systems which are not interchangeable, thus hindering the ability to have a complete picture of a patient. With respect to high-quality care, this is not guaranteed by the amount of care delivered or the amount spent towards it and it is important to achieve “good value for money” (OECD/WHO, 2011).

3.2.4 Challenges related to reimbursement in the outpatient sector

A final challenge on a system level is related to reimbursement in the outpatient sector, resulting in the TARMED which has undergone many transitions. Although solutions continue to be explored, such as the revision of the TARDOC developed by the Swiss association of physicians (FMH) and Curafutura which is intended to replace TARMED, some of the previous challenges may be resolved or some unforeseen ones may surface.

Finally, opportunities to improve coordinated care facilitation, greater investment in health promotion and health education, have both been recognized as means to help curb costs (De Pietro et al., 2015).

3.3 Strategies to improve the system

3.3.1 Broadly supported solutions take time

Solutions to improve the aforementioned issues can be achieved through financing or payment reforms, which have targeted and improved aspects such as the MHI system, hospital financing, and pharmaceutical regulations (De Pietro et al., 2015). However, many ideas over the past decade have been faced with significant “scepticism or opposition” (Swiss Academy of Medical Sciences, 2019). Despite the fact that smaller reforms are quite common in Switzerland, and rarely reversed once established, they require an agreement between many diverse stakeholders with varying interests and normally require a long time to be implemented.

3.3.2 Assessment of some funding models within the Health 2030 strategy

In December 2019, the Swiss Federal Government put forth the Health2030 strategy, with the vision for people in Switzerland to live in an environment that is conducive to health, regardless of their health and socio-economic status by benefiting from a modern, high-quality and financially sustainable health system (Bundesamt für Gesundheit, 2020). One of the objectives of the strategy was to safeguard care and funding by both providing more long-term care professionals and optimizing the funding of long term-care. The Federal Government proposed the existing funding models for long-term care be assessed, to establish whether changes are required in order to ensure that the services remain accessible to all as well as create new incentives for both innovation and efficiency.

3.3.3 The Expert Report I: A comprehensive catalogue of measures

Preceding the Health2030 strategy set out by the Swiss Federal Government, The Federal Department of Home Affairs (FDHA) at the beginning of 2017 commissioned a group of 14 Swiss and international experts to reflect upon national and international evidence and called upon their experience, to propose additional measures to subdue cost growth in the country. These measures have been compiled in the form of a report, henceforth referred to as "the Expert Report" (published originally in German) (Bundesamt für Gesundheit, 2017).

The report compiles data on the current situation, and describes existing and potential cost-cutting measures, subdivided into four sections: care and services; the pharmaceutical sector; total costs and tariffs; and indirect measures. Additionally, it includes an analysis of such measures implemented in three other countries (France, Germany and the UK), to draw conclusions on measures that could be tailored for Switzerland. It is finalized with recommendations on a new set of measures that could be implemented in efforts to contain costs.

3.3.4 The Expert Report II: Short- and medium-term measures – and a long-term reorientation of the health care system

The Expert Report notes that despite the existing cost-cutting measures, there has been a "systematic failure" and a delay in implementing them in Switzerland (Bundesamt für Gesundheit, 2017). The authors recommend focusing on measures beneficial in the short- and medium-term, and on a long-term reorientation of the health care system towards incentives that increase the overall well-being. To ensure the measures have an impact on cost growth, the authors focused on the four largest cost blocks of the MHI. The report also takes into account the extent to which these measures can be incorporated into the ongoing work of the Federal Government, by acknowledging necessary changes to the regulatory framework.

3.3.5 The Expert Report III: Approaches that already have been in the making and new ones

There are 38 measures in the Expert Report, 20 of which are considered to be of the highest priority. Of these high-priority measures, the recommendation for a binding target for the cost growth in mandatory health insurance and the introduction of an "experimental article" in the Federal Health Insurance Act (KVG[5]) are overarching measures that cover three additional sets of recommendations.

In the first set, the experts have placed the directly implementable measures such as: creating necessary transparency; shifting from stationary to ambulatory care; strengthening HTA; strengthening invoicing control; strengthening coordinated care; promoting treatment guidelines; promoting second opinion seeking and regional hospitals planning (Bundesamt für Gesundheit, 2017).

The second set of recommendations includes measures already discussed with a need for legal adaptations such as: strengthening the quality of service provision; keeping the tariff structure up-to-date; introducing a fixed amount (reference price) system and adjusting the distribution margins for pharmaceuticals (Bundesamt für Gesundheit, 2017).

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[5] Bundesgesetz über die Krankenversicherung (KVG) – The Federal Insurance Act

The final set of measures corresponds to new measures requiring legal adaptation like the following: committing to gatekeeping; preventing the misuse of supplementary insurance tariffs; introduce the cost effectiveness principle; creating a federal tariff organization (analogues to the SwissDRG) and setting a budget target in the outpatient sector (Bundesamt für Gesundheit, 2017).

3.3.6 The basic orientation of the Expert Report is widely shared

Many of these measures are further reiterated by the cost and reimbursement-related measures which are described in the recent position paper, “Sustainable development of the health system”, by The Swiss Academy of Medical Sciences (Swiss Academy of Medical Sciences, 2019). This position paper analyses the current situation and advocates for eight measures to improve the health system from their perspective being: using the Triple Aim Framework[6] as a compass to guide health professionals ; improving the availability of data ; regularly monitoring and revising the list of reimbursable services; considering different types of reimbursement models which deter “perverse incentives”; and that the Federal government sets a cap on health expenditures. Important notions can be drawn from this position paper with respect to the measures and needed actors.

Other authors also repeatedly take up the recommendations of the Expert Report, so that it has become a core piece of literature, which organizes the different challenges and solutions with respect to the health care system costs and is well-known in Switzerland. It therefore serves as a reference framework for this - less broad - Synthesis Working Paper, as will be explained in the next chapter.

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[6] The three dimensions are defined as follows: 1) improving the health of populations; 2) improving the patient experience of care (including quality and satisfaction), 3) reducing the per capita cost of health care.

4. Focus and method of this Synthesis Working Paper

Summary

This chapter shows how the present Synthesis Working Paper came into being and where its findings are to be placed in the current debate.

New evidence and decision-making guidance in specific areas

The NRP 74 projects addressing the issue of cost and reimbursement capture only a fraction of the entire health care system in terms of its efficiency potential. Nevertheless, this Synthesis Working Paper provides evidence in several specific areas and thus offers guidance to decision-makers.

The 2017 Expert Report as reference framework

To ensure that new findings from the NRP 74 research can be incorporated into current discussions and developments, it makes sense to place the respective projects in a thematic framework familiar to the expert community. This Synthesis Working Paper therefore uses the 2017 Expert Report discussed in chapter 3.3 as a reference framework and shows to which its proposed measures the NRP 74 can make significant contributions.

Consensus built in a conversational process

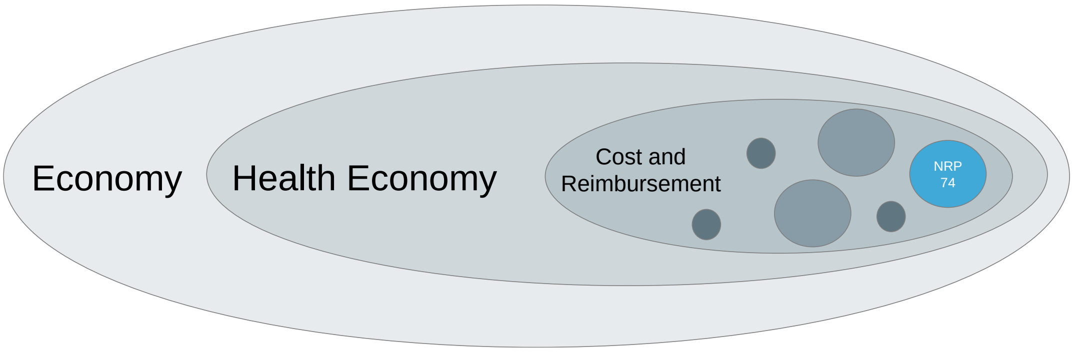
The recommendations that are brought forward in this Synthesis Working Paper were developed by the synthesis team over 1.5 years in a process that included extensive exchanges with the relevant NRP 74 project leaders and with stakeholders from the field. In addition to the NRP 74 research findings, the Synthesis Team has taken into account the current scientific and grey literature in Switzerland.

4.1 Research perspective

The NRP 74 includes several projects which touched on the topic of cost and reimbursement. However, given the complexity and multi-layered interrelationships in the Swiss health care system, it is hardly possible to capture the entire system in terms of its efficiency potential. But research can provide evidence in limited areas and thus offer guidance to decision-makers. Studies that analyse real processes in the Swiss health care system have the advantage that they always take into account the specifics of the system as a constitutive framework.

In this sense, NRP 74 provides individual pieces of the puzzle that can fill important gaps, even if the individual projects each covered a narrow and diverse aspect of the broader topic. In addition, general recommendations can be derived from many of the findings, as the discussions within the Synthesis Team, with other NRP 74 researchers and stakeholders have shown.

Figure 2: NRP 74 project foci in the context of health economics



4.2 The Expert Report of 2017 as reference framework

In order for the new findings from NRP 74 research to contribute to current discussions and developments, it is useful to embed them in the framework that is known and recognized in the field. This Synthesis Working Paper therefore uses the 2017 Expert Report[7] discussed in Chapter 3.3 as a reference framework. In this way, new findings help to sharpen existing courses of action and add new, refined aspects to them.

4.2.1 Expert Report measures to which several NRP 74 projects provide new input

The following overview (Table 1) lists all recommendations from the Expert Report to which at least three NRP 74 projects can make in-depth contributions. The corresponding NRP 74 projects are listed in the right-hand column, their methods, results, and conclusions are presented in more detail in chapter 5.

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[7] The report (German only) can be found on

https://www.bag.admin.ch/bag/de/home/versicherungen/krankenversicheung/kostendaempfung-kv.html

Table 1: Relation between Expert Report measures and NRP 74 projects

Expert Report Measure	**Summarized description**	**NRP 74 Projects**
Introduction of an experimental article in the KVG!!	Intended to create a clear legal basis for the implementation of innovative pilot projects, which can be used in particular to test measures to curb cost growth.	#2, #8, #12, #23
Creation of necessary transparency!!	This would ensure that all actors have the necessary data basis to carry out their tasks with regard to system control and optimization.	#2, #23, #32
Strengthening health competence and informing patients	The health competence of the Swiss population will be improved by increasing the level of information of (potential) patients and the associated personal responsibility. People should be able to move more efficiently in the health system, improve disease prevention and be more careful with their health. Moreover, it enables them to increasingly question the consumption of medical services and thus to contribute to the reduction of unnecessary services themselves and thus to save costs.	#2, #8, #23
Strengthen quality *(of service provision)*!!	To have fewer people suffer damaging incidents or expensive damages caused by medical work due to poor therapeutic quality. This goal is achieved by the participation of the service providers in quality improvement programmes, the adherence to defined and strict quality criteria as well as the obligation to conduct peer reviews with corresponding implementation of the results.	#2, #8, #23
Strengthening coordinated care!!	To improve the quality and cost-effectiveness of treatment for patients over the whole or large parts of the care chain.	#2, #8, #23(indirectly), #32
Commitment to gatekeeping!!	To provide insured persons with a first point of contact in the health care system. This is associated with coordination of treatments which should improve efficiency e.g., by avoiding unnecessary of multiple examinations in the context of referrals.	#13, #23, #32

Note: !! = measures, which the Expert Report indicated as top priority in terms of content and timing. NRP 74 Projects involved see Annexe 2.

4.2.2 Expert Report measures to which single NRP 74 projects provide new input

In addition, individual NRP 74 projects have provided additional input on the following measures proposed in the Expert Report: shifting from stationary to ambulatory care; promoting treatment guidelines; promoting flat rates in the outpatient sector; keeping the tariff structure up-to-date; introducing of a fixed amount (reference price) system; uniform financing of flat-rate services in the outpatient hospital sector and removing the so-called "double voluntariness" regarding electronic patient files (i.e., voluntariness of the outpatient service provider to use the electronic patient files, with simultaneous voluntariness of the patients to use it).

4.2.3 Further Expert Report measures discussed in the synthesis process of NRP 74

Nevertheless, while their projects may not have directly contributed, PIs also reflected on the importance of other needed measures such as the use of the HTA, the important role of managed care contracts, revising the reimbursement system of physicians, alternative methods of value-based reimbursement of pharmaceuticals, identifying low-value care, use of quality circles and data-driven quality improvement, incorporating the perspective of patients and frontline professionals when defining quality of care, and finally, transitioning from the idea of these measures into real-life practice.

4.3 A synthesis process engaging researchers and stakeholders

4.3.1 Interviews and discussions with NRP 74 researchers

This Synthesis Working Paper provides broad recommendations and insights on potential fields of action to improve the reimbursement systems based on relevant NRP 74 projects. For this purpose, the Synthesis Team analysed all reports from the respective projects and sent out a questionnaire to all Principal Investigators (PIs) to determine whether their work can contribute to the topic of cost and reimbursement. Based on their feedback, the synthesis team identified six PIs with whom they conducted in-depth interviews.

These PIs were also asked to produce a summary of their research, highlighting their results and the relevance for the Swiss health care system, as well as deriving recommendations from their work. The Synthesis Team condensed and reviewed all this input and compared it with the state-of-the-art scientific evidence in literature as well as in grey reports of Switzerland. In addition, The Synthesis Team gathered feedback on its method and insights in several conferences and meetings with a broader set of NRP 74 researchers and Steering Committee.

4.3.2 Stakeholder involvement in individual research projects

There are many stakeholders important to engage in the discussion of cost and reimbursement in Switzerland, from federal offices to patient organisations to insurance companies. Each NRP project involved multiple of these stakeholders, as project partners or in the planning phase. Among them are: Association of hospitals H+, santésuisse, curafutura, Swiss Medical Association FMH, Federal Office of Public Health, GP network FIRE, Federation of associations of psychiatric patients' relatives, expert patients, health professionals (e.g., GPs, nurses, pharmacists). In this way, many needs from practice have been incorporated into the actual research.

4.3.3 Stakeholder dialogue on synthesis findings and conclusions

For the purposes of this Synthesis Report, key stakeholders were invited to an online dialogue meeting with the Synthesis Team as well as the president of the NRP 74 Steering Committee, its Programme Manager and its Head of Knowledge Transfer. The aim of this event was to gather the stakeholders' feedback on the insights and recommendations elaborated by the Synthesis Team and discuss them regarding implementation aspects. There were 13 representatives of stakeholder organizations in attendance.[8]

Stakeholders were provided with the most important findings in advance and asked for a first (written) feedback on points, which are of great concern to them. At the dialogue meeting, the Synthesis Team presented more background on its findings and conclusions, before stakeholders met in smaller groups (in online break out rooms) to discuss the relevance and feasibility of the insights and recommendations. A final plenary discussion provided another opportunity to point out missing or particularly critical aspects

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[8] The following stakeholders were represented at the June 28 dialogue meeting: Association of General Practitioners and Paediatricians Switzerland mfe, Association of hospitals H+, Social Security and Health Committees SSHC of the Swiss Parliament, Spitex Switzerland, Swiss Association of Cities, Swiss Cancer League, Swiss Conference of the, Cantonal Ministers of Public Health, Swiss health insurance association curafutura, Swiss health insurance association santésuisse, Swiss Medical Association FMH

and differing opinions. The meeting revealed widespread agreement on recommendations, while regarding implementation many valuable suggestions were voiced from different perspectives.

5. NRP 74 research addressing current challenges

Summary

This chapter gives a more detailed description of the NRP 74 projects which contributed to the topic of cost and reimbursement in Switzerland, including their background, methods used, results and conclusions for implementation.

Six specific topics

Of a total of 34 NRP 74 projects, six contributed to the topic of cost and reimbursement in Switzerland. Of these, the research goals of four projects were specifically related to the topic (chapters 5.1 to 5.4) whereas the remaining two (chapters 5.5 and 5.6) provide valuable contributions, although they were not predominantly centred on aspects of cost and reimbursement.

- Effects of GP practice closures on costs
  (NRP 74 project No. 13, chapter 5.1)
- Effects of fee for service vs. capitation reimbursement systems on physicians' service provision
  (NRP 74 project No. 12, chapter 5.2)
- How financial incentives influence GPs treatment of diabetes
  (NRP 74 project No. 23, chapter 5.3)
- Costs related to poor continuity of care for chronic patients
  (NRP 74 project No. 32, chapter 5.4)
- Role of gatekeeping
  (NRP 74 projects No. 13 and 32, chapters 5.1 and 5.4)
- The role of participatory medicine to improve quality of colorectal cancer screening
  (NRP 74 project No. 2, chapter 5.5)
- Cost-effectiveness of a new of mental health treatment delivered at home
  (NRP 74 project No. 8, chapter 5.6)

5.1 Project 13: Physician retirement, practice closures and discontinuity of care: how does it affect patients' health care utilization and health-related outcomes?

Project leader: Michael Gerfin, Department of Economics, University of Bern

5.1.1 Background

The sufficient and efficient provision of primary care services is an important goal in every health care system. Indeed, mounting evidence documents that the supply of primary care physicians is positively associated with health outcomes and negatively associated with health care costs (Macinko et al., 2003, Starfield et al., 2005, Ricketts and Holmes, 2007, Gravelle et al., 2008, Chang et al., 2011, Shi, 2012). This issue is especially pressing because many countries face an aging physician workforce (OECD, 2017) and shortages of general practitioners (GPs) as the inflow of primary care residents fails to meet the increasing demand (Bodenheimer and Pham, 2010, Huang and Finegold, 2013). Consequently, self-employed GPs may be increasingly forced to close down their practice when they retire, which bears obvious consequences for patients, who have to seek care elsewhere or forgo care. Yet, the existing literature offers no evidence as to how the retirement of GPs and practice closures affect patients.

This project fills this gap: The objective is to analyse empirically the causal impacts on patients arising from practice closures of GPs. In particular, the research team addresses how patients' utilization patterns change and investigate whether health-related outcomes such as hospitalization rates and health care expenditures are affected. Further, they analyse which groups of patients are more strongly affected than others.

From the perspective of patients, practice closures bear important consequences, especially in the case of long-standing doctor-patient relationships (Scott, 2000).Practice closures generate a discontinuity of care and lower the availability of local primary care services. First, this may lead to inefficient utilization of health care services (e.g., non-urgent emergency department visits) and thus has implications for health care planning and social health insurance. Second, the retirement of the regular GP may have adverse effects on patients' outcomes, since interpersonal continuity of care is generally found to be beneficial to patients' health. Moreover, practice closures may have heterogeneous effects across regions: The impact in peripheral areas with low physician density may be more pronounced compared to areas with high physician density.

Furthermore, the research team uses data from several sources. The primary source is register data from a large Swiss health insurer (CSS Insurance) and its subsidiaries. The data cover the period 2005 to 2016 on a claims level for all individuals who were enrolled with the insurer for at least five consecutive years. For each insurance claim, the provider, beginning and end of each treatment spell, cause of treatment (illness or accident), the number of consultations, and expenditures by category (total, inpatient, outpatient, drugs, etc.) are observed.

Information on practice closures is not available in any existing data source. For this reason, the research team performed primary data collection. As a first step, they drew on a national database with provider-level time series on the monthly number of consultations to identify potential practice closures. In a second step, the extensive field research was conducted to separate practice closures from other events, mostly by means of telephone interviews. In total, about 900 inquiries by phone were carried out. As a result of the data collection, a sample of 257 GPs who closed their practice during the period from 2007 to 2014 was gathered. By contrast, there are 3,064 continuously operating primary care providers.[9]

5.1.2 Methods

The basic idea of the analysis can be described as follows: the research team compares the outcomes of an affected group of patients (so called treatment group, which is exposed to a practice closure) with a group of unaffected patients (control group not exposed to a practice closure). Overall, their dataset comprises 210,475 individuals, including 12,958 treated patients. The researchers made the two groups as similar as possible with respect to the time before the practice closure using regression and weighting methods. The research team estimates how the number of visits to different kinds of providers changes due to practice closures compared to a baseline, which measures the expected number of visits if the practice closures had not occurred.

5.1.3 Results

The main results are briefly summarized as follows (see Table 2). First, the researchers find evidence that patients respond to the retirement of their regular primary care provider by changing their utilization patterns. The number of visits to a GP falls by 12%, which corresponds to 17 visits per 100 patients. In

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[9] A detailed description of the data preparation steps can be found in Bischof and Kaiser (2021).

contrast, practice closures cause an increase in visits to specialist practices and hospital outpatient facilities. The main takeaway from these findings is that 45% (8 out of 17) of the missing GP visits are not substituted by visits to other providers. Compared to the baseline of 148 GP visits per 100 patients this implies that 5% of expected GP visits do not take place anymore due to practice closures.

Second, the results show that while the interruption of primary care provision has no significant impact on total health care expenditures, the costs per visit increase by roughly 4%, indicating that patients seek care from more costly sources. However, it should be noted that these are only short-term effects. If missing GP visits have adverse health impacts at a later stage (because illnesses may not be detected at an early stage), then there may be large, long-run effects on health care expenditures. Hospitalization rates and mortality are not affected by practice closure. The number of ambulatory providers is slightly increased, suggesting a more fragmented care (both results are not shown in the table).

Table 2: Main results

	Estimate	In % of baseline	Baseline
Utilization (per 100 patients)			
GP visits	**-17**	-12	148
Specialist visits	**7**	11	67
Hospital visits (outpatient	**2**	6	39
Total number of visits	**-8**	-3	255
% GP visits not substituted	45		
Health Care Expenditures			
Total health care expenditures	16	1	1’223
Health care expenditures per visit	**4**	4	87

Note: Data is measured in quarterly terms. Estimates in bold are significant on the 5% level. All numbers are rounded to the nearest integer.

The researchers also found that the magnitude of patients’ reactions depends substantially on the degree of availability of primary care (see Table 3). A practice closure in a region with low availability reduces the number of GP visits by 12% and the total number of visits by 5%.[10] 72% of the lost GP visits are not substituted by visits to other providers, which amounts to almost 10% of expected GP visits not taking place anymore. As a consequence, there is no impact on total health care expenditures and health care expenditures per visit.

Table 3: Results by availability of primary care

	Low GP Density			High GP Density		
	Estimate	In % of baseline	Baseline	Estimate	In % of baseline	Baseline
Utilization (per 100 patients)						
GP visits	**-18**	-13	137	**-17**	-11	158
Specialist visits	**4**	7	66	**10**	15	67

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[10] Low (high) availability is defined as living in a region in the bottom (top) third of the GP density distribution.

Hospital visits (outpatient	1	2	39	**4**	10	40
Total number of visits	**-13**	-5	241	-3	-1	265
% GP visits not substituted	72			18		
Health Care Expenditures						
Total health care expenditures	2	0	1’194	10	1	1’275
Health care expenditures per visit	1	1	91	**5**	6	86

Note: Data is measured in quarterly terms. Estimates in bold are significant on the 5% level. All numbers are rounded to the nearest integer.

In contrast, the substitution is more pronounced in high availability areas, where patients have much easier access to alternative providers such as walk-in clinics or emergency rooms. While the drop in the number of GP visits in these regions is of similar magnitude as in the low availability regions, the total number of visits does not decline significantly. This leads to an increase in health care expenditures per visit.

Finally, the researchers differentiate between patients without and with chronic conditions.[11] Table 4 summarizes the findings. Among patients without chronic conditions the total number visits declines by 5% and 73% of missed GP visits are not substituted. There is no effect on health care expenditures. Among patients with chronic conditions the total number visits declines by 2% and 33% of missed GP visits are not substituted. However, this effect is not precisely estimated. Especially in this population this may lead to adverse health outcomes at a later stage. On the other hand, the majority of patients with chronic conditions is able to substitute, which is good from a medical perspective, but increases health care expenditures per visit by 5%.

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[11] A chronic condition is defined as belonging to a PCG (pharmaceutical cost group), which are measured by the regular prescription of a drug to treat a chronic condition.

Table 4: Results by chronic condition

	No Chronic Condition			Chronic Condition		
	Estimate	**In % of baseline**	**Baseline**	**Estimate**	**In % of baseline**	**Baseline**
Utilization (per 100 patients)						
GP visits	**-11**	-12	90	**-24**	-12	206
Specialist visits	**3**	6	42	**12**	13	92
Hospital visits (outpatient	0	1	21	**5**	8	58
Total number of visits	**-8**	-5	154	-8	-2	355
% GP visits not substituted	73			33		
Health Care Expenditures						
Total health care expenditures	-8	-2	495	40	2	1'945
Health care expenditures per visit	1	2	60	**6**	5	114

Note: Data is measured in quarterly terms. Estimates in bold are significant on the 5% level. All numbers are rounded to the nearest integer.

5.1.4 Conclusions for Implementation

Based on these results the research team concludes:

- Practice closures lead to significantly fewer primary care visits than before. Some consultations do not take place anymore and others are substituted by more expensive ones (specialists and outpatient hospital departments)
- In regions with low physician density, patients are affected more strongly by practice closures because they struggle to find a new regular GP. In regions with high physician density, patients are much more able to substitute.
- Closures of primary care practices lead to more costly utilization of health care (specialists and outpatient hospital departments) leading in an increase in the expenditures per visit.
- While the researchers find no short-term impact on health care expenditures this may be different in the longer term.

Consequently, the research team recommends:

- At the policy (macro) level:
  - On the demand side, their results suggest that primary care providers exert an important gatekeeping function for patients in the health care system and might curb inefficient utilization. Strengthening gatekeeping in mandatory health insurance is part of the current reform proposals by the Swiss Federal Council.
  - On the supply side, the results may contribute to the current political debate on health care planning and provider approval in the ambulatory sector. On 9 May 2018, the Federal Council issued a bill on the approval of providers in mandatory health insurance. The bill envisages that cantons will be obliged to actively regulate physician supply. The results may raise awareness among cantonal health authorities regarding the effects of changes in availability of primary care services. It is necessary to improve the geographic distribution of physicians.
- At the management (meso) level):

  - Increase awareness of the importance and improve the attractiveness of primary care among young physicians and students of medicine.
- At the level of interaction (micro)
  - Retiring physicians inform their patients, especially chronically ill, about the importance of the continuity of care and recommend suitable replacements. However, this appears to be done already on a regular basis.

5.2 Project 12: Smarter Physician Reimbursement: Evidence from recent German and Swiss Reforms

Project leader: Stefan Felder, Wirtschaftswissenschaftliche Fakultät, Health Economics, University of Basel

5.2.1 Background

The health economics literature has long had a strong interest in studying how over, under-, and wrong provision of care can be addressed by designing smarter reimbursement schemes for physicians. The specific design of the reimbursement of health services leads to different incentives for health service providers. Prospective reimbursement (partly) shifts financial risk towards the providers and therefore affects provision and possibly quality of services (Ellis and McGuire, 1986, Ma, 1994). Whereas reimbursement by fee for service (FFS) incentivizes providers to increase the number of services provided, a compensation scheme in the form of capitation per enrolled patient, flat rates and capitation fees could potentially prevent such overtreatment. Generally, physicians have economic incentives to reduce the amount of services as reimbursement becomes increasingly more independent from service provision (Hennig-Schmidt et al., 2011). Unfortunately, this may cause the pendulum to swing in the other direction and result in an undersupply of health services and treatment quality (Hennig-Schmidt et al., 2011).

Switzerland

The current fee-for-service tariff system in the Swiss outpatient care sector was introduced in 2004. It details over 4,600 different physician services. A reform implemented in October 2014 attempted to shorten the revenue gap between general practitioners (henceforth referred to as GPs) and specialists. For this purpose, it introduced a consultation bonus of CHF 9 for GPs and paediatricians. At the same time, it decreased the fees for several technical services typically invoiced by specialists (e.g. imaging services) by 8.5%. It was expected that the reform would redistribute about CHF 200 million from specialists to GPs.

The aim of this part of the project was to analyse empirically the causal impacts of the reimbursement reform on physician behaviour in terms of their consultations and the time spent with patients at the first stage, and their billing practices of the services targeted by the reform in the second stage.

Germany

During the last two decades, several German sickness funds introduced selective contract schemes with the objective to improve the quality of medical care and to contain rising costs in the health care sector.

In Germany, physicians in the outpatient sector are traditionally reimbursed by FFS[12]. The introduction of GP-centred care in 2008[13] brought prospective reimbursement elements for specific aspects of outpatient care. The aim of this reform was to strengthen the coordinative function of physicians and to avoid intersectional problems between in- and outpatient care (Klora et al., 2017).

In this context, the German part of the NRP 74 focusses on a selective contract with paediatricians in the state of Baden-Wurttemberg. With the introduction of the selective contract for paediatric care (SCPC) in 2014 to meet the specific needs of treating children, reimbursement changed from FFS to a more prospective compensation for participating physicians. In this context, the researchers focus on the differences in service provision between physicians participating in SCPC and traditionally reimbursed physicians.

5.2.2 Methods

Data of Switzerland

SASIS AG in Solothurn provided access to physicians claims data. This included information from both the Tariff and Data Pool for all physicians of the outpatient sector of Switzerland who could be identified via their practice identity number or *Zahlregisternummer*. The data contained the number of consultations, patients, and services billed by the physicians at the monthly level for the years of 2013-2105. Due to the sensitivity of the data, however, the contract stated a strict confidentiality of information, which forced the research team to process the data on-site in Solothurn.

Data of Germany

Access to data for the German part of the project had some set-backs in the beginning. The death of Deputy President Ekkehard Ruebsam-Simon of Medi-Verbund, who was the contact person during the preparation of the project, and the German partner Medi-Verbund, led to a delay in the access to the data. Luckily because of good relationship with the largest sickness fund, the AOK Baden-Wurttemberg, the research team got access to their claims data.

Methods Switzerland

The panel structure of the data and the nature of the reform allows for a Difference in Differences (DID) estimation with physician and time fixed effects, whilst controlling for physician characteristics such as age, gender, and experience, as well as the canton and region of practice. The researchers ran an event study which not only allowed to test for effects in the pre-reform period, but also to see the dynamic effects of the reform. For the first stage of the analysis, the researchers do not differentiate between the groups of GP's and paediatricians. The treatment group is therefore the entire GP and paediatrician sample. As the researchers do not have a pure control group (i.e., a group of physicians that were not affected in any way by the reform which are comparable), they take the weakly treated specialists as the control group. In the second stage, the researchers disentangle the effects of the different components of the reform (i.e. the consultation bonus and the fee reduction) by interacting different treatment and control groups and adopting a DID with a treatment intensity approach as developed by Fricke (Fricke, 2017). The researchers thus begin with a sample of 9,123 physicians – with 4,792 of them belonging to

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[12] Compensation for outpatient services is quite complex. Basically, physicians do not receive payments for services provided directly from the statutory health insurance, but from the Associations of Statutory Health Insurance Physicians). The health insurance fund pays a "total compensation" to the physician's association covering all necessary medical treatments of the insured. The association then allocates the funds to the physicians mainly according to FFS.

[13] § 73b SGB V (German Social Security Code V).

the balanced panel (i.e., physicians for whom they have observations for every period of the two-year analysis).

Methods Germany

The research team's approach exploits a natural experiment generated by the reimbursement change for amblyopia screening for a large public German sickness fund's SCPC in 2014. This unique data set covers the period from 2010 to 2017. It contains information on diagnoses and characteristics of both physicians and patients. The researchers analyse whether reimbursement change affects the average number of diagnoses per physician. The panel structure of the data allows the use of a generalized difference-in-difference estimation approach in order to control for time-invariant unobservable confounders. The research team focuses on changes in the numbers of diagnoses[14] made by physicians who owned a suitable screening device. Additionally, patient and physician characteristics are controlled for. The identification approach of the research team uses paediatricians participating in SCPC as treatment and paediatricians who are not participating in SCPC as a control group. The treatment group comprises 208 physicians and the control group 158 individuals. This constitutes one of the largest samples to study outpatient-care provision under a specific selective contract in Germany so far.

5.2.3 Results

Switzerland

The main results are briefly summarized as follows (see Table 5). In order to capture the effects of the reform without confounding the treatment effect with other possible factors that may alter physicians' behaviour, the sample is restricted to one year before and after the date of the reform. The DD models are run for the time span between October 2013 and October 2015 on the four outcome variables. The researchers find that GPs, following the reform, decreased their monthly number of consultations by 4.95 (about 2%). The number of consultations per patient increased by 0.033 (2.6%), and the total duration of a consultation decreased by 2 minutes (6.5%). The pure talking time decreases by less than a minute (5.6%). Both the number of consultations as well as the talking time are significant at the 1%, with the consultations per patient and the total duration of a consultation being significant at the 5%. The services affected by the fee reduction decrease after the reform both in total and per patient. GPs and paediatricians decrease the services affected by the reform 3.18 units of billing and 0.01 billings per patient. The coefficients are significant at the 1% level and represent a decrease of 6% and 4.7% respectively. Furthermore, the reform leads to a decrease in the revenues from the unaffected services billed by GPs. Primary care physicians decrease their revenues by CHF 468 which amounts to approximately 2.5% of their revenue from these services. When the revenues per patient are analysed however, the coefficients are positive and statistically not different from zero. Results are consistent with the findings when excluding physicians near the age of retirement and balancing the panel.

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[14] One major shortcoming is the lack of screening documentation (i.e. neither have physicians to document screenings in ordinary scheme nor in SCPC), therefore we use the number of diagnoses as a proxy for conducted screenings.

Table 5: Effects of reimbursement reform on outcome variables

	Basic Model (1)	Sample physicians under 60 (2)	Balanced panel physicians under 60 (3)
Consultations	-4,95 ***	-5,55 ***	-2,62 ***
	(0.650)	(0.70)	(1.40)
per patient	0,03 **	0,03 **	0,03 **
	(0.013)	(0.01)	(0.01)
Affected services billed	-3,18 ***	-2,64 ***	-2,75 ***
	(0.26)	(0.31)	(0.33)
per patient	-0,01 ***	-0,02 ***	-0,01 ***
	(0.00)	(0.00)	(0.00)
Revenues of	-468,43 ***	-439.835 ***	-570,26 ***
unaffected services*	(124.49)	(153.68)	(164.73)
per patient	0.57	0.56	0.05
	(0.95)	(1.19)	(1.15)
Observations	192,527	133,539	115,008
Total duration of	-2,01 **	-2,30 **	-2,51 **
a consultation (min.)	(0.93)	(1.10)	(1.23)
Talking time of	-0,77 ***	-0,87 ***	-1,13 ***
a consultation (min.)	(0.22)	(0.24)	(0.27)
Observations	192,086	133,331	114,962
Physician practices	9,123	6,310	4,792
Robust standard errors in parentheses. * p < 0.10, ** p < 0.05, *** p < 0.01			
Physician & time fixed effects. Physician & patient characteristics are controlled for in all specifications			

Note: * revenues from the consultation bonus are excluded

The second analysis seeks to disentangle the effects of the 2 elements of the reform. For this GPs are separated in four different groups. Departing from Fricke (Fricke, 2017), the researchers assume that each of the paired groups reacted in the same way to the corresponding treatment. As this is a strong but difficult assumption to test, the analysis cannot claim pure causality. The pairing of the groups is as follows: the weakly treated specialists constitute the control group for the weakly affected GPs. From the corresponding DD, the researchers identify the consultation fee effect for the weakly treated. The intensely affected specialists are the control group for the intensely affected GPs, as they both often invoice technical services. Assuming that they reacted in the same way to the reduction fee, the consultation fee effect for the intensely treated is separated. Finally, the weakly affected GPs are taken as a control group for the intensely treated GPs, once again under the assumption that a consultation fee of CHF 9 resulted in an increase of consultations. This, finally, provides the effect of the fee reduction.

The researchers find a statistically significant negative consultation fee effect on the total number of consultations the intensely treated GPs (see Table 6). However, the effects on the number of consultations per patient differs for the different GP groups. The weakly treated GPs have an increase in the number of consultations per patients, whereas the intensely treated GPs have a decrease due to the consultation fee alone. In both cases, there is a decrease in both the total duration and the talking time. The fee reduction effect is negative for the number of consultations, which is in line with the researchers' theoretical conjecture. If GPs get paid less for their time, they will reduce the number of consultations in order to have more leisure time.

Table 6: Multiple treatment effect

Treatment Effect	**Consultation fee**		**Fee Reduction**
Treatment group	**Weakly double treated GPs**	**Intensely double treated GPs**	**Intensely double treated GPs**
Control group	**Weakly treated specialists**	**Intensely treated specialists**	**Weakly double treated GPs**
Consultations	-0,83	-4,66 ***	-2,16 ***
	(0.81)	(0.61)	(0.66)
Consultations per patient	0,03 ***	-0,01 **	0,00
	(0.01)	(0.00)	(0.01)
Observations	45,192	150,888	103,200
Total duration of a consultation (min.)	-1,24	-1,78 ***	-1,37
	(1.81)	(0.44)	(1.35)
Talking time (min.)	-0,90 **	-0,65 ***	-0,31
	(0.36)	(0.17)	(0.31)
Observations	45,156	150,867	103,169

Robust standard errors in parentheses: $*$ $p < 0.10$, $**$ $p < 0.05$, $***$ $p < 0.01$; Physician & time fixed effects, physician & patient characteristics are included in all specifications

Germany

Table 7 shows the impact of SCPC participation on the average number of quarterly diagnoses using the fixed-effects model. The coefficient of the treatment variable (Treatment) representing the effect of SCPC participation on the average number of diagnose is significantly positive (0.490) in the base model (1a). The estimated effect of program participation remains significant and slightly increases in magnitude (to 0.512) when further covariates are added (columns a-1). The estimated coefficient for the treatment dummy in the fully specified model (h) indicates that physicians who participate in SCPC are characterized by an incidence-rate-ratio of about 1.67. This means that the implementation of SCPC has caused an increase of almost 70% in the rate of amblyopia and amblyopia-related diagnoses compared to standard care. Interestingly, the estimated effect for regional structure (Regional structure) is for all specifications (b-h) positive and significant. The results indicate that physicians with patients-bases located in urban regions make on average higher numbers of diagnoses compared to physicians with more rural patient-bases. Furthermore, the researchers find that the estimated effect of parent's enrolment is positively associated with the number of diagnoses and slightly significant. In contrast, the estimation results indicate no significant impact of patients-base' average socio-economic status on the number of diagnoses. Also, the fraction of patients with non-European and European citizenships seem to have no impact on diagnoses frequency. The researchers find evidence that parent's enrolment status in selective care has a positive effect on diagnoses frequency for both participating and non-participating physicians. Finally, average morbidity of patients-base and physicians' age do not seem to have an impact on the number of diagnoses as estimated coefficients are close to zero for both covariates for all specifications (b-h).

Table 7*:* Effects of reimbursement reform on number of amblyopia diagnoses

Dependent variable: Number of amblyopia and amblyopia-related diagnoses per quarter

	(a)	**(b)**	**(c)**	**(d)**	**(e)**	**(f)**	**(g)**	**(h)**
Treatment	0.490***	0.494***	0.498***	0.507***	0.507***	0.509***	0.507***	0.512***
	(0.15)	(0.15)	(0.15)	(0.15)	(0.15)	(0.15)	(0.15)	(0.15)

Dependent variable: Number of amblyopia and amblyopia-related diagnoses per quarter

	(a)	(b)	(c)	(d)	(e)	(f)	(g)	(h)
Regional structure		0.568+	0.677*	0.677*	0.677*	0.760*	0.764*	0.763*
		(0.34)	(0.34)	(0.34)	(0.34)	(0.32)	(0.33)	(0.32)
GISD			1.415	1.356	1.373	1.520	1.522	1.538
			(1.28)	(1.27)	(1.29)	(1.38)	(1.38)	(1.37)
Fraction female				-1.749	-1.777	-1.745	-1.736	-1.794+
				(1.11)	(1.10)	(1.08)	(1.07)	(1.08)
European					1.844	1.935	1.958	1.983
					(1.89)	(1.92)	(1.90)	(1.89)
Non-European					0.101	0	-0.001	-0.006
					(1.17)	(1.13)	(1.13)	(1.13)
Participation parents						2.702*	2.708*	2.698*
						(1.34)	(1.34)	(1.34)
Morbidity							0.000	0.000
							(0.00)	(0.00)
Age pediatrician								-0.082
Fraction enrolled patients								(0.08)
Treatment*Fraction enrolled patients								
Quarter fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
N	8,298	8,298	8,298	8,298	8,298	8,298	8,298	8,298
Number of groups	359	359	359	359	359	359	359	359
Observation per group								
Min	5	5	5	5	5	5	5	5
Average	23.1	23.1	23.1	23.1	23.1	23.1	23.1	23.1
Max	28	28	28	28	28	28	28	28

Robust standard errors are in parentheses. + p≤0.1, * p≤0.05, ** p≤0.01, *** p≤0.001

5.2.4 Conclusions for Implementation

Switzerland

1. Evidence on how physicians respond to financial incentives, focusing on GPs’ supply of consultations and their duration.

2. The researchers show that GPs decrease the monthly number of consultations as well as the number of consultations per patient.
3. The fee reduction led to a decrease in the quantity of affected technical services, including diagnostic imaging. This result is also in line with economic reasoning, in particular since the revenue effect of the fee reduction for technical services is comparably low for GPs.

Germany

1. That the selective contract of paediatric care in in Baden-Wuerttemberg appears to have reached its declared objective of improving care measured by an increase in screening frequency (diagnoses) for an important visual disorder in children aged 2-3 years
2. The researchers' findings do not support theoretical predictions that capitation induces under-provision of health services (e.g.(Ellis and McGuire, 1986)). Contrary to the literature, the research team does not analyse a situation where reimbursement of a third-party payer switched from FFS to capitation.
3. The researchers' results indicate that a change in paediatric reimbursement from fee-for-service (paid out-of-pocket by patients) to a lump-sum payment (paid by the statutory health insurance) does not reduce the screening efforts of paediatricians but instead is rather associated with an increase in the number of diagnoses.
4. Smartly designed capitation seems to be an efficient tool for physician reimbursement given that physicians are sufficiently interested in patients' well-being and that physician costs for services compensated via capitation are relatively low. Thus, satisfaction of these two conditions has to be comprehensively assessed before implementing capitation.

Based on the results the researchers make the following recommendations:

1. At the policy (macro) level: Politicians are worried about the ever-rising health care costs. They should understand that costs can ultimately not be curbed top down by regulating tariffs more intensively. Exit options should allow health insurers and health care providers to do selective contracting and find decentralized solutions.
2. At the management (meso) level): In ambulatory care, the tariffs are predominately based on fee-for-services. This gives too much leeway for providers for overtreatment. A mixed tariff that partly uses flat elements of reimbursement would be warranted. Professional associations as well as the cantons monopolize contracting which is detrimental to the health care system.
3. At the level of interaction (micro): Free up contracting between health insurers and health care providers.

5.3 Project 23: Impact of financial incentives to improve quality indicators in diabetes patients

Project leader: Thomas Rosemann, Universitätsspital Zürich, Institut für Hausarztmedizin

5.3.1 Background

Evidence regarding pay-for-performance (P4P) programs is inconclusive. However, P4P interventions might be an interesting approach to improve adherence to guidelines and improve quality of care in primary care. Effectiveness of P4P programs highly depends on the study type (randomized controlled trial, before-after design, interrupted time series), investigated quality indicators (process versus outcome variables), type of health care system (gatekeeping versus non-gatekeeping) and study participants (large scale community clinics versus single-provider primary care practices), patient selection (socioeconomic status, multimorbidity, insurance type) as well as the method and level of payment(Scott et al., 2011, McDonald et al., 2009, Christianson et al., 2008).

Randomized controlled trials from countries outside of Europe and the USA have shown positive effects of certain P4P interventions (Menya et al., 2015, Peabody et al., 2014, Chang et al., 2012, Chen et al., 2011) whereas evidence from randomized controlled trials in Europe is lacking. A systematic review (Van Herck et al., 2010) concludes that financial incentives targeting indicators that can be directly altered by providers (e.g., the number of measurements) have shown greater effects than financial incentives targeting indicators that can only be indirectly influenced (e.g., blood pressure - BP values).

In Switzerland, no data on the P4P approach exists and the use of QIs (Quality Indicators), especially in primary care has been marginal. The main reason might be that documentation in primary care is still mainly paper-based instead of based on electronic medical records (EMR)(Otte-Trojel et al., 2015). General practitioners (GPs) do not receive external (financial) incentives for EMR implementation; they bear the electronic system costs themselves. There is evidence for technical assistance and financial incentives-alongside EMR implementation being able to improve quality of care (Ryan et al., 2014, Begum et al., 2013) at least modestly, when it comes to improvements in cardiovascular care processes and outcomes (Bardach et al., 2013).

Switzerland is therefore an optimal setting for investigating the effect of financial incentives in primary care. In the current study, a P4P approach in primary care using clinical routine data of patients with diabetes mellitus was assessed. The principal aim of this study was to test whether financial incentives on quality indicators in the treatment of patients with diabetes in primary care led to a more effective treatment. Further, the researchers also aimed to investigate associations of quality indicator performance with practice, GP and patients' characteristics. The research team chose the study population to be diabetic patients, since diabetes is highly prevalent and has high morbidity and mortality.

5.3.2 Methods

This was a parallel cluster randomized controlled trial based on the FIRE database (Family Medicine ICPC -Research using Electronic Medical Records), of the Institute of Primary Care at the University of Zurich. In the FIRE database, 290 GPs from 14 German speaking Swiss cantons voluntarily documented their consultations in an EMR using the ICPC-2 coding system (Schäfer, 2005). FIRE is to date the only medical routine database in Swiss primary care allowing for many different analyses. The researchers state that to the best of their knowledge, they are the first to implement a randomized controlled trial investigating the effect of financial incentives on the quality in diabetes care in Europe, and especially in Switzerland. They also emphasize that even outside Europe, their trial is one of a handful randomized controlled trials on this matter.

In June 2018, eligible GPs received an invitation to participate in the study. Per practice, multiple GPs were contacted if data availability and data quality criteria were fulfilled. From the participating GPs, the researchers included all patients diagnosed with diabetes mellitus. The randomization into the control and the intervention group took place at the practice level. 71 GPs (median age 52 years, 72% male) from 43 different practices and subsequently 3838 patients with diabetes mellitus (median age 70 years, 57% male) were included (Meier et al., 2021).

A clinical quality measure and a process quality measure were incentivized to test the effect of financial incentives on different types of QMs and to investigate the spill-over effect on non-incentivised QMs. The intervention consisted of the following: both groups received a bimonthly diabetes feedback report containing information on their patients with diabetes mellitus (age, gender and body mass index), the proportion of patients receiving at least one HbA1c measurement within the last 12 months, and the proportions of patients with BP measurements and achieving the target BP level. Further, the report contained a key message addressing various issues in the treatment of patients with diabetes mellitus. The intervention group was additionally informed about the incentive at the beginning of the observation period and in a reminder sent after six months. The researchers had announced that the PCPs in the intervention group will receive an incentive of 75 Swiss Francs per percentage point improvement in the reported QIs after the observation period. The control group was blinded to the incentives provided to the intervention group. The financial incentives stopped 12 months after baseline whereas bimonthly feedback reports have continued for another 12 months.

5.3.3 Results

In this parallel cluster RCT, the analysis after the intervention (12 months) indicated that financial incentives did not have a significant effect on primary outcomes; the proportion of patients receiving annual HbA1c measurements and the proportion of patients achieving the recommended BP target level was stable.

After 12 months, the proportions in all four non-incentivized QIs increased slightly for the intervention group, whereas for the control group only the proportions for cholesterol QIs increased. The logistic regression analysis revealed that the intervention had a significant spill-over effect on the two (non-incentivized) process QIs of the secondary outcomes (see Table 8); yet the mechanism of spill-over effects of financial incentives is unclear.

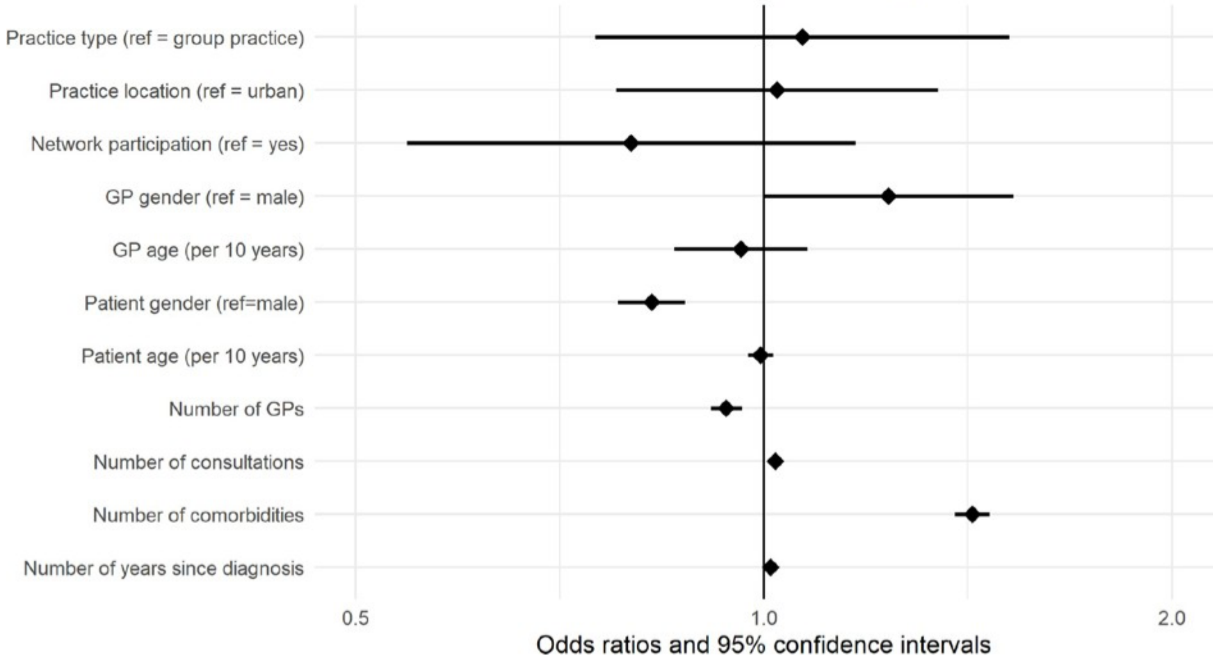
Table 8: Interactive effect of time and intervention over the entire observation period.

Primary outcomes				
Type	***Subject***	**OR**	**95% CI**	**p-value**
Clinical QM	Blood pressure	1.16	0.99 - 1.36	0.06
Process QM	HbA1c	1.09	0.90 - 1.32	0.39
Secondary outcomes				
Type	***Subject***	**OR**	**95% CI**	**p-value**
Process QM	Blood pressure	1.24	1.02 - 1.50	<0.05
Clinical QM	HbA1c	1.15	0.97 - 1.35	0.11
Process QM	Cholesterol	1.17	1.00 - 1.38	<0.05
Clinical QM	Cholesterol	1.06	0.90 - 1.25	0.47

The model is adjusted for age and gender of the GPs and the volume of patients with diabetes mellitus per GP.
QM: quality measure; OR: odds Ratio; CI: confidence interval

This study investigated the associations of practice, GP and patient covariates with proportion of patients fulfilling the quality indicators. At baseline, there was no substantial effect found from GP and practice characteristics on QI performance, whereas several patient characteristics showed small effects (see Figure 3). However, the available characteristics could only explain a small extent of the observed variation, indicating that some potentially important characteristics were not available.

Figure 3: Associations with cumulative quality measure performance



ref = reference; GP = general practitioner.

Conclusions for Implementation

Currently the Swiss health care system is undergoing massive transformations concerning reimbursement models. In the inpatient setting, the DRG system has been implemented in 2012 according to the German DRG system. In the outpatient setting a revision of the TARMED reimbursement system is also currently under way, consisting of a slight qualitative improvement of GP's reimbursement compared to other medical specialties while limiting certain positions quantitatively. On the other hand, health insurance companies are looking for new reimbursement models and QIs to differentiate among the very heterogeneous GP networks. The question, how reimbursement systems should be adapted is therefore a pressing issue. In order to provide stakeholders with an adequate basis of information and for a sound political decision-making process, it is essential to have the scientific knowledge based on the care provided in primary care practices. In conclusion, this study will provide a knowledge base for the ongoing political discussion on whether the implementation of P4P is a useful and realistic approach to improve care for patients with chronic diseases in primary care. Therefore, the researchers believe that this study might have a major impact on health care reimbursement models.

The overall conclusions for implementation therefore include:

- The potential of financial incentives to improve the quality of diabetes treatment may be limited if they are not combined with other quality measures. In order to improve the design of financial incentives and potentially maximize their impact, behavioural economic principles should be given greater consideration.
- For a systematic assessment of quality of care, clinical routine data must not only be available electronically but also be presented in a structured format and be of high quality.
- Future research could conduct a qualitative assessment to examine the GPs opinion on the financial incentives and to investigate the mechanism of spill-over effects (status: in progress).

5.4 Project 32: How to improve care coordination for people with chronic conditions in Switzerland?

Project leader: Joachim Marti, Institut Universitaire de Médecine Sociale et Préventive – IUMSP, CHUV and University of Lausanne

5.4.1 Background

The Swiss health care system is facing considerable challenges from the increasing number of chronic and multi-morbid patients, characterized by complex needs and frequent transitions between care settings. The fragmentation of the system in terms of care pathways, providers and financing mechanisms, and a still traditional focus on acute care, make care integration and coordination difficultand lead to an inefficient allocation of resources. As health expenditures are increasing faster than GDP, the financial pressures on households and public budgets are important, and policies need to ensure that high-quality care is provided in a sustainable way. The general aim of this project is to support the design of health policies centred on improving the efficiency and value of care for patientwith multiple chronic conditions, taking both population preferences and needs into account. Specifically, we are using an approach that combines preferences elicitation methods, analyses of secondary datasets and micro-simulation models to highlight optimal care strategies for population groups with homogenous needs and preferences. Our project focuses on the 50+ population, which ismost likely to benefit from improvements in chronic care management, with one in five individuals having multiple chronic conditions beyond the age of 50. The main objectives of the project are:

1. To measure continuity of care (COC) in the 50+ population, describe the characteristics of population groups with poor COC, and therefore, understand which groups would benefit most from better care coordination and integration
2. To elicit preferences of the 50+ Swiss population for characteristics of coordinated chronic care models and assess the acceptability of organizational changes.
3. To analyse the potential health economic impact and sustainability of new integrated chronic care models that are in line with 50+ population preferences.

5.4.2 Methods

Work package 1 aims at measuring continuity of care (COC) using administrative data, as well as its association with health care use, costs, and multimorbidity. First, a rapid literature review has been performed to identify the COC measures derived from claims-based data that were used in various countries and study settings. An emphasis has been put on the association between COC, health care use and costs, the methodological choices made in the studies, and the interpretation of the indices. A paper is now submitted and is under review in the journal BMC HSR. Then, after obtaining the approval from the ethics committee, administrative data was received from the health insurance company Groupe Mutuel. The dataset includes more than 200’000 individuals aged 50+, continuously enrolled between 2015 and 2018. After data preparation and cleaning, the following analytical steps were undertaken:

1. calculation of five established COC indices yearly and over the whole observation period of 4 years, based on all doctor consultations and based on primary care only;
2. multivariate analysis of the association between (multi) morbidity and COC indices using various proxies for multimorbidity (number of PCGs, individual PCG groups and cluster analysis of PCGs);
3. exploratory analyses of the causal relationship (using instrumental variables approach) between COC and specific outcomes (hospitalizations and costs) and the influence of morbidity. Four papers are planned based on the performed analyses: a descriptive analysis of continuity of care in Switzerland considering different time horizons (short-term 1 year versus 4-year observation period)

(short report is under review in the journal BMJ Integrated Care), a paper on the association between COC and multimorbidity with a special focus on the ways to express morbidity with claims data (paper prepared for submission in HSR), an econometric analysis of the impact of continuity of care (or lack thereof) on health care use and costs (work in progress). The short paper has been prepared to investigate patient multimorbidity and complexity beyond simple counts of chronic conditions. We presented a novel approach of using cluster analysis, based on pharmacy-cost groups from claims data, to identify and characterize clinically relevant patient subgroups with common patterns of health care utilization. The paper has been submitted to JMIR Medical Informatics. We are also planning a more methodological paper on a finer interpretation of COC indices (e.g. by accounting for the sequence and time between contacts with providers, through the creation of clusters of trajectories). For this part of the project, extra data points were requested from Groupe Mutuel, which were approved and are currently in the preparation process.

Work package 2 aims at investigating patient and population preferences for new care models facilitating integrated and coordinated care using Discrete Choice Experiments (DCE). The development of the DCE followed best practice and consisted of several steps. First, we reviewed the literature on DCE aimed at evaluating models of care to identify a long list of potential attributes. We then conducted a focus group and follow-up rounds of individual feedback with relevant stakeholders (health insurance, cantonal health authorities, family medicine, an integrated care network, nursing, and patients). From there, an initial short-list of attributes was defined and tested in three focus groups with members of the public and patients aged 50 and above (n=20). The phrasing, complexity of choice tasks, and the ability to make trade-offs were also explored in the focus groups. Finally, we developed the survey which collects, in addition to the DCE choice tasks based on 6 selected attributes, information on demographic characteristics, health status, health care use, health insurance, trust in national health care, health literacy, and a Swiss-specific section related to effectiveness and financing of the health care system. The pilot testing of the survey was performed online with 300 residents of Swiss French cantons aged 50+ and showed favorable feedback from respondents. In addition to checking readability and duration/complexity of the survey, the pre-test allowed us to improve the efficiency ofthe experimental design for the final version of the survey. The results of the pre-testing revealed thatmost attribute coefficients had expected signs, matching those found in the literature and expressed during the focus groups. The main survey was launched in March 2021 online with 1000 participants in Suisse Romande and was complemented with paper-based surveys for older (>70 years) individuals.We received a total of 975 completed DCE surveys which was considered sufficient for the analysis. The paper covering the DCE development is under review in the journal The Patient and the abstract has been accepted for an oral presentation at the EuHEA 2020 Conference in Oslo, which now is postponedto 2022 due to Covid. Additionally, a collaboration with the Lucerne team (Interface, Lucerne University with A.Balthasar, C.Kaufmann and Z.Föhn) has been established to exchange on methodological aspects of DCE. A joint DCE workshop with invited international experts was planned in fall 2020 (postponed until January 2022), and EHCL agreed to provide the funding. Regarding the DCEdata modelling, we performed the two types of analyses, i.e., a more policy-oriented one and an analysis focused on the heterogeneity of population preferences. First, we applied nested models to understand the relative importance the population attach to attributes/attribute levels and willingnessto pay for certain characteristics, based on which we were able to project the acceptability of certain selected policy scenarios. Moreover, we were able to define background characteristics associated with propensity to choose the existing status quo. Second, we applied latent class modelling to detectseveral (i.e., 3) distinct types of respondents within the sample with similar preferences and background characteristics. The two papers on the main results of the DCE are in progress.

Work package 3 will combine findings from the first two work packages and will build a policy simulation model to test long-term implications of new care models. We have established a collaboration with the NRP 74 project 33 of Prof. Schoenenberger to test various modelling strategies and work on a joint simulation tool. We will construct a semi-Markov projection model of multi-morbidity and associated costs in the long-term. This semi-Markov model will be based on individuals reflecting the age, gender, and morbidity structure of the 50+ Swiss population. The cohort transitions between morbidity states (which are likely to be reflected by PCG information, for instance “healthy”, “1 PCG”, “2+ PCG”, or health care costs) and death. Transition probabilities between morbidity states and death will be calculated to populate the model. Currently, the additional dataset with more granular information has been requested (and approved) from Groupe Mutuel to calculate these transition probabilities performed by a team group member, specifically involved for this role. Eventually, this model will allow making projections of health care use and costs under various scenarios reflecting the likely impact of new policies or care models (e.g., slower transition to a “complex” state, lower costs of managing complex patients, etc.).

5.4.3 Results

- *Literature review:* Overall, 14 various COC indicators were identified in the selected studies using claims data, and the most commonly used indices were COCI and UPC. Most reported studies showed that higher COC was associated with lower health care use (hospitalizations, avoidable hospitalizations, ambulatory care–sensitive condition, hospital readmissions and emergency department) and costs. Most studies adjusted for possible time bias and discussed causality between the outcomes and COC, or at least acknowledged the lack of it as a limitation.
- *Continuity of care (COC):* Broad COC based on all consultations appeared moderately low among Swiss residents, although comparable to other countries. Primary care COC indices were close to perfect continuity. The choice of index and time horizon can influence COC, as all indices have different interpretations and calculations. Therefore, for some indices COC observed over a long time can be lower or higher than COC observed over a conventional period of 1 year.
- *COC and multimorbidity measurement in claims data:* The findings demonstrated that although the relationship between morbidity and COC is significant (and positive), the magnitude of the association was modest. The approach using clinically relevant disease groups showed largest heterogeneity in the COC and its association with multimorbidity, while simple PCG counts showed the lowest variations and weakest associations (see Additional Figure 6). The data-driven approach revealed that most complex individuals tend to have higher broad COCI. For COC in primary care, exclusively visiting one GP was expected, which was the case of 70% of the sample. However, COC GP was lower for patients with multiple PCGs, for “Oldest at risk”, and patients with mental diseases. The other significant determinants of COC were age, gender, residing in the French-speaking region of Switzerland, the deductible of the insurance, and the insurance model with gatekeeping.
- *Causal link between COC and outcomes: I*nstrumental variable was a strong instrument for identifying causal relationship, and the analysis showed clearly that improved COC decreases costs (total and ambulatory), hospitalizations, and consultations at the specialists. The results were stable even when accounting only for community-dwelling individuals (excluding residents of nursing homes)
- *Findings from cluster analysis:* Various clustering methods have been tried out, and finally, HDBSCAN[15] method has been used for defining the clusters, based on PCG groups, with similar health care utilization and costs. The cluster analysis identified seven distinct groups (see Additional Table 12): individuals without diseases (70%), patients with only hypertension-related diseases (9.7%), patients with only mental diseases (4.1%), complex high-cost high-need patients (4.4%), slightly complex patients with inexpensive low-severity PCGs (3.8%), patients with one costly disease (5.6%), and older high-risk patients (2.8%).[16]

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[15] Hierarchical Density-Based Spatial Clustering of Applications with Noise

[16] The paper has been accepted for publication in Journal pf Medical Informatics JMIR : Nicolet A, Assouline D, Le Pogam M, Perraudin C, Bagnoud C, Wagner J, Marti J, Peytremann-Bridevaux I. Exploring patient multi-morbidity and complexity using health insurance claims data: a cluster analysis approach. JMIR Medical Infor-matics. 06/02/2022:34274 (forthcoming/in press).

- *Final list of attributes in DCE:* Based on the input from the stakeholders and the focus groups with target population, the following characteristics of health care delivery model were selected for the experimental part of the survey: 1) data sharing (access to the medical record); 2) insurance premium; 3) care coordination; 4) gatekeeping and free access to the specialist; 5) deductible and co-payments for chronic patients; and 6) financial support for informal care (see Table 9 below).
- *Initial findings from DCE pilot testing:* Overall, it was shown that all doctors having access to the medical record of the patient and having a family doctor coordinating care were the most preferred characteristics of health care delivery model. In contrast, having a referent person from health insurance coordinating care, or health insurance having access to the medical record of the patient were highly unfavourable by respondents. Free access to the specialist and restricted access via gatekeeping were valued by respondents similarly positively. Social solidarity was shown in favour of chronic patients, whereby their exemption from paying deductibles and co-payments was preferred over current situation (when chronic patients pay both co-payments and deductibles). However, compensation for informal caregivers turned out insignificant with very small effect sizes, which normally would reflect the lack of importance attributed to this characteristic. Although due to the pilot nature of this stage and small sample size, the main survey is likely to show a different outcome.[17]
- *Initial findings from the main DCE survey (Policy-oriented):* Participants tended to value coordination attribute most of all, followed by premium, access to medical file, informal care compensation and access to the specialist (see Additional Figure 7). The lowest importance was attributed to the attribute of exemption of chronic patients from paying deductibles or co-payments. The highest willingness to pay (WTP) was found for the care coordinated by a GP or a team, followed by allowing access to the patient medical file to all the doctors involved in care. The scenarios with gatekeeping access to the specialist become preferable than the standard model when the GP is formally coordinating the care (see Additional Figure 8). Non-doctor formally coordinating care is preferable than no coordinator even in a current status quo scenario. However, the non-doctor coordinator becomes preferable than coordination fulfilled formally by a GP or a team only in the following “best-case” scenario: informal care is formally compensated with access to additional services, all doctors involved in care have access to the medical file, and premium reduction. Age, higher income quartile and standard insurance model significantly increases the propensity to choose status quo, while lower education (high school or apprenticeship) reduces the propensity to choose status quo.
- *Initial findings from the main DCE survey (Heterogeneity of the population):* Using latent class modelling three distinct groups were defined. First is the group of younger, progressive, higher educated, more open to reforms individuals (23%), who value data sharing and coordination by the GP or a team, support informal care compensation and do not appreciate further premium increase. Second is the group of more conservative wealthier individuals who are more satisfied with the current state of health care system (59%). These individuals accept only coordination by the team or a GP, oppose restricted access when a GP only can access the medical file, against exemptions of chronic patients from payments and against informal care compensation. They prefer no changes in premium (neither increase nor decrease). Third was the group containing all status quo choosers and lower quality answers (18%). Further investigation of groups is in progress.

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[17] The paper has been accepted for publication in Journal pf Medical Informatics JMIR : Nicolet A, Assouline D, Le Pogam M, Perraudin C, Bagnoud C, Wagner J, Marti J, Peytremann-Bridevaux I. Exploring patient multimorbidity and complexity using health insurance claims data: a cluster analysis approach. JMIR Medical Informatics. 06/02/2022:34274 (forthcoming/in press).

Table 9: Final list of attributes and levels

Attributes	Levels
Which professionals have access to my DEP?	• My family doctor only • All the doctors involved in my care • All health professionals (doctors and non-doctors) involved in my care • All health professionals (doctors and non-doctors) involved in my care as well as my health insurance
Who coordinates my care?	• No health care professional • My family doctor • A health professional who is not a doctor • A health care team including several health care professionals (doctor and non-doctor) • A referent (doctor or non-doctor) from my health insurance
Access to the specialist	• Direct access possible (free choice) • Need to be referred by a family doctor (gatekeeping) • Direct consultation possible if the specialist is on a list (limited choice)
What do insured with chronic illness pay?	• Pay both deductible and co-payment • Pay only co-payment • Pay only deductible • Pay neither deductible nor co-payment
Formal compensation for care and support for caregivers	• Yes • Yes, formal compensation and access to specific services • No
Change in my monthly basic healthinsurance premium	• – 50 CHF • – 100 CHF • My monthly premium stays the same • • + 50 CHF • • + 100 CHF

5.4.4 Conclusions for Implementation

- Continuity of care based on all consultations appeared moderately low among Swiss residents, although comparable to other countries
- Primary care continuity, being close to perfect continuity, showed high COC with general practitioners in Switzerland
- Continuity of care appeared lower in French-speaking cantons compared to other regions
- COC showed large variation depending on the disease group, while much lower variation was detected using a simple PCG count (multimorbidity proxy) approach. The data-driven cluster analysis approach revealed that most complex individuals tend to have higher COC
- Health insurance model with gatekeeping was associated with higher continuity of care, demonstrating that in gatekeeping systems patient care was received from fewer sources. Thus, generalization of gatekeeping is important to consider in the policy-making process while developing strategies aimed at improving continuity of care
- Low continuity of care is associated with higher costs, which suggest that improving COC might lead to efficiency gains in the system

- Numerous comments for the survey revealed high level of interest and social relevance of the following topics in the population: choice, use and costs of health insurance as well as views on health care in Switzerland overall, and specific issues such as data sharing and interprofessional care
- Views on health care system in Switzerland based on 300 completed pre-testing surveys: more than half of the participants (57.1%) think that Swiss health care system needs no or small amount of reforms; 70% think that it is unfair that richest get the best care; however only 18.3% are ready to pay more taxes for better medical care for everyone in Switzerland; 72.4% support the system with public basic health insurance
- The main DCE survey revealed that in the context of health care delivery for chronic patients, the highest importance was attached to coordination of care, with GP or interdisciplinary teams as coordinators being the preferred options. Additionally, high importance was attached to premiums, whereby the stability of the premium ("status quo") was preferred. Finally, providing access to the electronic medical record was valued higher than access to the specialists or informal care compensation.
- The main DCE analysis allowed distinguishing three distinct groups in the sampled population: 1) conservative population valuing stability with opinion that small or no reforms are needed, not supporting informal care compensation or exempting the chronic patients from deductibles and co-payments (majority); 2) younger less wealthy population with progressive views who are supporting reforms, informal care compensation, value extended data access to electronic medical record and coordination fulfilled by the GP or an interdisciplinary team, and 3) lower quality answers given by mostly sick, less wealthy and less critical participants constantly choosing status quo (opting out).

5.5 Project 2: Shared decision making in colorectal cancer screening in primary care: a cluster randomized controlled trial

Project leader: Reto Auer, Berner Institut für Hausarztmedizin (BIHAM), Universität Bern

5.5.1 Background

Colorectal cancer (CRC) is a prime example of a preventable, non-communicable disease (NCD). The relative risk of ever-dying of CRC is low (2%), and that number is halved when those over 50 are screened by colonoscopy or faecal immunological test/faecal occult blood test (FIT/FOBT). Despite the effectiveness of these tests, only 40% of the eligible Swiss population is up-to-date with screening, below the desirably 65% target set in the 2012 Guidelines from the European Commission (von Karsa et al., 2012). Screening uptake may be low because people do not like the screening options they are offered. Guidelines for screening recommend either colonoscopy, an invasive procedure with a about 2/1000 risk for serious bleeding, or FOBT/FIT, which requires people to sample their faeces (a distasteful prospect for many), after which colonoscopy may still be recommended if the FOBT/FIT test is positive. In Switzerland, it was not known why most eligible people have not been screened. There was not yet enough data for the research team to judge whether people are making an informed choice congruent with their values when they refused screening or if their primary care physician (PCP) failed to offer them the option of screening (or a single option for screening). Screening rates are significantly higher in some other countries, especially in those that take an "opt-out" approach to screening (they assume all eligible citizens should be screened), in comparison to Switzerland where an "opt-in" approach is common. If a PCP suggests the FOBT/ FIT test, or if they actively ask their PCP for screening, basic insurance will reimburse patients aged 50-69 for a FIT or colonoscopy. Both screening options have varying levels of burden, one of which is cost. While a colonoscopy is more accurate, it is also more costly than FOBT. Reimbursement is ensured for both tests, but the franchise and the co-pay are not, except if persons eligible for screening live in a canton with an organized screening program (e.g., Canton Vaud). Though guidelines recommend primary care physicians (PCPs) offer patients a choice between colorectal cancer

(CRC) screening methods including colonoscopy and faecal occult blood testing (FIT), most PCPs prescribe only colonoscopy, which may discourage some patients from opting to be screened.

In 2015, the canton of Vaud launched the first organized screening program in Switzerland. Their approach was innovative and focused on “active choice.” Instead of presuming all eligible persons should be screened, the Vaud program helped them make an informed choice about: (a) whether to be screened for CRC and (b) which method of screening (FIT or colonoscopy) is best for them. In this program, eligible citizens of this canton are invited to discuss their choices for CRC screening with their PCPs, in a 15 to 30-minute, deductible-free, shared decision making (SDM) visit. The research team believes the Vaud program is the first to shift the paradigm from “uniformed compliance” to “informed choice”. In informed choice programs, the outcome shifts from the percentage of the population screened to the percentage of the population that makes an informed decision about screening.

PCPs handle screening differently, thus the biggest challenge the Vaud program faced was the variation in care for CRC screening between PCPs, a variation also reflected across Switzerland. Some PCPs do not offer eligible patients the option to be screened (there is underuse of screening), most offer only colonoscopy and some only offer FIT (overuse of one screening method over the other). Only some neutrally present a choice of colonoscopy or FIT and share up-to-date evidence to help patients understand the difference between them. Based on research in other studies, PCPs who successfully help patients to arrive at participatory decisions about screening will have variation in care within their practices, since some patients refuse whereas some will opt for FIT and others for colonoscopy. In this overall project, to help patients decide whether and which form of CRC screening they prefer, the research team developed an intervention with the goal was to reduce variations in screening practice between PCPs and increase variations within PCP practices.

Two aspects of this overall study will be elaborated further within this synthesis report. One arm aimed to analyse CRC testing rates in Switzerland, screening methods and variations in care among PCPs. For the next arm, the aim was to test the effect of a multi-component data-driven training program to increase the proportion of patients who meet with their PCPs to make a shared, informed decision about (a) colorectal cancer screening (counting refusal of screening as a choice) and (b) CRC screening method (FIT or colonoscopy).

5.5.2 Methods

The research team first aimed at describing the proportion of 50-75-year-old patients who visit a primary care physician’s (PCP) office and were tested for colorectal cancer (CRC) by either colonoscopy within 10 years or faecal occult blood testing (FOBT) within 2 years and to describe variations in care between PCPs (Braun et al., 2019). The team used a participatory approach to develop a data collection form, adapting the data collection method developed within the Sentinella practice-based research network (PBRN), where a convenience sample of 100 to 150 general practitioners, internists, and paediatricians in private practices voluntarily report weekly morbidity data to the network (Federal Office of Public Health, 2018). The first data collection started among 120 invited Sentinella PCPs in 2017. A total of 91 PCPs of the Sentinella Network (71%) participated and provided data on 3’451 patients. Using the data collection form the research team developed, PCPs collected demographic data and CRC testing status from 40 consecutive patients. It is important to note that this data was collected fully anonymously; patients were identified only by birth year and gender and did not record the date data was collected. This method enabled PCPs to systematically collect patient data without requiring informed consent by patients, a crucial aspect to ensure representativity of the studied sample.

In parallel to the data collection among PCPs, the research team had the opportunity to re-analyse data from the Swiss health interview survey (SHIS) in order to verify their retrieved rates among PCPs and study factors associated with CRC testing (Braun et al., 2020). Swiss insurance offers high or low deductibles and choice of basic or private insurance. The research team hypothesized that high deductibles and basic insurance discourage colonoscopy, but do not change FOBT rates. They determined the proportion of patients tested for CRC in Switzerland (colonoscopy within 10 years, FOBT within 2 years), identified changes in testing rates over time, and determined associations with health insurance type. For this analysis, they extracted data on 50-75-year-olds from the Swiss Health Interview Surveys of 2007 and 2012 to determine colonoscopy and FOBT testing rates. They fitted multivariate logistic regression models to estimate prevalence ratios (PRs) of CRC testing associated with health insurance type (deductible and private insurance), adjusted for socio-demographic factors (age, gender, education, income) and health care use.

The data collection described in paragraph 1 of this section was repeated in 2018 when the research team conducted a RCT among these PCPs. PCPs were randomized to either a multidimensional intervention that promoted shared decision-making (SDM) in CRC screening or to usual care. PCPs in the intervention group received a mailed package containing the study rationale, patient-decision aids to support SDM, a 2-page evidence summary on CRC screening, an immunological FOBT sample kit, and individualized performance feedback based on data they had collected about their CRC screening practices in 2017. PCPs from both groups systematically collected data on 40 consecutive 50–75-year-old patients, including demographic data, data on previous CRC testing, and the decision the patient made after the discussion (screening method, patient’s refusal). PCPs completed a questionnaire about their intention to prescribe FOBT or colonoscopy. The primary outcome was the number of PCPs with at least one patient who had had an FOBT at baseline or who planned FOBT after discussion.

5.5.3 Results

I. CRC testing rates in Switzerland

a. CRC testing rates in PCP practices

Among 3’451 patients, 45% had been tested for CRC within recommended intervals (41% colonoscopy, 4% FOBT) (Braun et al., 2019).Proportions of patients tested and tested with colonoscopy vs. FOBT varied widely between PCPs. More than half of PCPs (59%) had no patients tested with FOBT.

b. Variation in care between primary care physicians for colorectal cancer screening methods and patient’s refusal to screen

The research team aimed to determine the proportion of patients who opted for screening with colonoscopy or FOBT and the proportion of patients who refused testing among 50-75-year-olds eligible for screening who visited their PCP (Martin et al., 2019). Data was analysed from 91 (71%) PCPs and 3,451 patients. PCPs could discuss screening with 51% of eligible patients (no previous tests and no contraindications for testing). After excluding patients with risk factors or symptoms suggestive of CRC, 61% opted to be screened (FOBT/colonoscopy ratio: 0.5), 29% refused, and 6% were undecided. PCPs who prescribed only colonoscopy had lower screening rates and higher rates of refusal than PCPs who prescribed both FOBT and colonoscopy; findings which were confirmed in a mixed-effects multivariate model (OR 3.90, 95%CI 1.90 to 8.00, $p < 0.001$).

c. CRC testing rate in the Swiss general population

The research team found that in 2012, the weighted proportion of individuals (aged 50-75) tested for CRC within recommended intervals was 40% (33% for colonoscopy and 13% for FOBT) (Braun et al., 2020). After adjusting for covariates, private insurance and low deductible significantly increased chances of CRC testing, indicating that waiving the deductible could increase CRC screening uptake and reduce health inequality. FOBT was not associated with private insurance.

II: Development and test of a multidimensional intervention by mail with data collection on 40 consecutive patients by PCPs within the Sentinella practice-based research network: Randomized controlled trial (RCT)

Although this study is not yet published, the research team found that of the 109 PCPs who were randomized, 79 (64%) collected data. Mean PCP age was 51; 73% were men. PCPs collected data on 3,017 patients (mean age 62; 50% women). The 38 PCPs in the intervention group were more likely to have had at least one patient tested with FOBT at baseline or a patient who planned FOBT after discussion (89%) than PCPs in the control group (61%; p=0.004). PCPs in the intervention group were more likely to intend to prescribe FOBT to ≥40% of their patients (58%) than PCPs in the control group (28%; p=0.016). The research team concluded that the multidimensional mailed intervention promoting SDM in CRC screening increased the number of PCPs who prescribed at least one FOBT to their patients and significantly increased PCP intentions to use FOBT, suggesting our intervention increased the likelihood patients would be tested with the method they preferred. However, they still found PCPs who did not change their prescription behaviour among the intervention group. In addition, PCPs belonging to Sentinella PBRN likely represent a selected group of PCPs used to respond to email mediated efforts to improve quality of care.

5.5.4 Conclusions for Implementation

Based on these results, the research team concludes and recommends the following:

1. Most PCPs only prescribe colonoscopy, and few prescribe both options. This conflicts with data from studies by others in Switzerland suggesting that preferences in the general population is evenly split between colonoscopy and FOBT. There is a mismatch between patient's preferences of method of screening and the choice offered by PCPs.

2. Analyses of the SHIS suggested that low deductible and private insurance were strong predictors of CRC testing, in particular of colonoscopy. While this association is not causal, given the context of Switzerland with the franchises allowed to go up to CHF 2500, Swiss insurees might refrain from taking over the cost of CRC screening, in particular the costly colonoscopy. Screening for CRC is a short-term monetary health-related investment in order to avoid future health issues and associated costs expected to occur 5 to 10 years later. Insurees opting for a high franchise because of limited financial resources might be directly impacted by the high franchise allowed in Switzerland.

    - Organized screening programs, who waive deductible for CRC screening, might effectively reduce short-term financial barriers of CRC screening and reduce future health disparities.

3. A multilevel intervention promoting SDM in CRC screening decision and developed through participatory methods with and for PCPs could effectively reduce variation between PCP practices variations in methods for testing and increase variation within each PCP practice. Less PCPs only prescribe colonoscopy to their patients and more PCPs offered both options for testing, suggesting they might have adapted their prescription to patient's values and preferences.

    - Participatory methods to develop quality metrics and interventions in primary care can effectively change PCPs practices.

5.6 Project 8: Cost-effectiveness of Crisis Resolution Home Treatment for acute psychiatric management in Southern Switzerland

Project leader: Luca Crivelli, Department of Business economics, health and social care, University of Applied Sciences and Arts of Southern Switzerland

5.6.1 Background

The worldwide growing importance and increased frequency of mental health conditions in the last decades has raised the issue of a transition towards a mental health system, which is more centred on patients' and families' needs and provides a better balance between community- and hospital-based alternatives. Crisis Resolution Home Treatment (CRHT), an alternative to standard hospital treatment for the management of acute psychiatric crises, represents a key element of this transition process. CHRT has gained a growing consensus over time because of its capacity to leverage on the psychosocial dimension intrinsically related to mental health crises and to reduce stigma (due to institutionalization) for both patients and families. However, despite the increasing implementation of CRHT worldwide, evidence on its effectiveness and, especially, cost-effectiveness in comparison with standard inpatient treatment in contemporary mental health systems is still limited.

In the Canton of Ticino (Southern Switzerland), the regional public psychiatric hospital (Cantonal Psychiatric Clinic, CPC) substituted an acute hospital ward with a CRHT team from April 2016 on. The researchers designed their cost-effectiveness study within this setting, with the intention of providing detailed fresh evidence on the topic.

5.6.2 Methods

Due to organizational and logistic reasons, the CRHT service could be offered only to patients living in the northern part of the Canton. The researchers used a natural experiment based on geography (quasi-experimental design) to allocate patients to the intervention (CRHT) and control (inpatient treatment) groups according to the place of residence.

Patients were recruited between mid-March 2017 and the beginning of April 2019. Inclusion criteria were as follows: 1) being between 18 and 65 years of age and 2) suffering from an acute psychiatric crisis requiring hospitalization. Exclusion criteria were compulsory admissions, acute alcohol or drug intoxication, extreme agitation and/or aggressive behaviour, acute risk of suicide/self-harm, acute risk for others persons (e.g. family members) and being an inmate. However, certificates of compulsory hospital detention rescinded and/or acute drug or alcohol intoxications resolved within 48 hours from hospitalization allowed the inclusion in the study. Moreover, patients were considered eligible if their hospitalization period before being transferred to the CRHT service did not exceed 48 hours. Finally, patients with a treatment length of less than seven days were further excluded because they most probably did not actually meet the criteria for a major acute psychiatric crisis. To ensure a high degree of comparison between the two groups, patient living in the southern part of the Canton were included in the study only in case they were willing to accept CRHT (even if acceptance did not imply the actual assignment to the treatment).

Sociodemographic and clinical characteristics of the patients were collected with the aim of accounting for group differences when comparing effectiveness and costs and building cost-effectiveness acceptability curves (CEAC). For both groups the researchers collected data on gender, age, nationality, educational level, civil status, living arrangement, working condition, primary psychiatric diagnosis, presence of a secondary diagnosis, compulsory admission, number of previous hospitalizations and psychiatric symptoms level at admission [measured by the Health of the Nation Outcome Scales (HoNOS)[18] score].

The researchers collected data on direct and indirect costs separately for the treatment phase and for the 2-years follow-up period after discharge. For the treatment phase, the CPC provided actual direct costs (i.e., personnel, operating and central services costs), that were available by treatment arm only on a yearly basis. To calculate the cost per patient, the researchers first divided the arm-specific yearly costs by the total yearly number of hospital or CRHT inpatient days to find the average daily costs of the two treatments[19]. The direct treatment costs for each patient were then calculated by multiplying the patient-specific number of inpatient days by the arm- specific average daily treatment costs. For the follow-up phase, costs reimbursed by health insurers were obtained from the patients' health insurance companies. For inpatient hospital treatments, reported bills were adjusted to account for the share covered by the cantonal authorities (45% insurers, 55% Cantons).

For both the treatment and the follow-up phases, indirect costs corresponded to the costs of lost production and were estimated by valuing the number of sick leave days (medically certified) using regional age- and gender-specific median gross salaries.

The researchers collected data on 3 effectiveness measures. For the treatment phase, they assessed the variation in psychiatric symptoms by measuring the difference in the HoNOS score between admission and discharge. For the 2-years follow-up phase, they calculated the number of days outside the psychiatric hospital (non-readmission days) and the proportion of total costs not related to psychiatric treatments (i.e. we excluded psychiatry/psychotherapy sessions, psychiatric clinic inpatient and outpatient treatments, psychiatric drugs consumption), the latter being an inverse broader relative measure of psychiatric services importance after discharge.

5.6.3 Results

The researchers recruited in total 321 patients; 87 were further excluded because they most likely did not meet the criteria for a major acute psychiatric crisis (treatment period shorter than 7 days) or because they were transferred to another healthcare facility before the end of the treatment. 237 patients were available for data analysis, 93 in the intervention (CRHT) group and 144 in the control (hospital) group. The treatment phase cost-effectiveness analysis was performed on 208 patients for which the researchers had admission and discharge total HoNOS scores. The statistical and cost-effectiveness analysis for the follow-up period was performed so far on 98 patients for which the researchers already obtained cost data from the health insurance companies, 43 in the intervention group and 55 in the control group. Until the end of the project the researchers plan to reach an approximated sample size of 160 patients.

Treatment phase analysis' results

The researchers first illustrated the distributions of total actual costs (including indirect costs of lost production) and reduction in psychiatric symptoms at discharge by arm. They noticed the strong right skewness of the costs' distributions, more marked for hospital treatment, but also the slight skewness (left for the control group and right for the intervention group) of the psychiatric symptoms' variation. For more details see Additional Figure 9 in Annex 2.

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[18] The Health of the Nation Outcome Scales (HoNOS) is a 12-items instrument widely used to assess the health and social functioning of people with severe mental illness. Every item has a score ranging from 0 (no symptoms) to 4 (severe symptoms); therefore, its total score ranges from 0 to 48.

[19] The researchers were obliged to give up the possibility to weight cases in the two arms based on the TARPSY case-mix system. On the one hand, TARPSY was not available in 2017 and, on the other hand, the system underwent significant adjustments between 2018 and 2019.

The researchers found that the unadjusted average total costs of treatment (CRHT: 17’064.39 CHF vs CPC: 18’888.57 CHF; p-value=0.209) and the average variation of psychiatric symptoms at discharge (CRHT: -8.53 HoNOS points vs CPC: -9.68 HoNOS points; p-value=0.216), even though lower in the intervention group, did not differ significantly between the two groups. For more details see Additional Table 13 in Annex 2.

In the adjusted analysis, the researchers found a lack of statistical significance at the 5% level of the differences in adjusted total costs (-3’090.86 CHF on average for CRHT; p-value=0.079) and psychiatric symptoms variation at discharge[20] (+1.58 on average for CRHT; p-value=0.150) between the intervention and control groups. However, when using 90% instead of 95% confidence intervals (which the researchers considered a less risk averse when making financial decisions than when making clinical decisions, as suggested by McCrone et al., 2004) the adjusted total costs resulted significantly lower for CRHT (Table 10 below).

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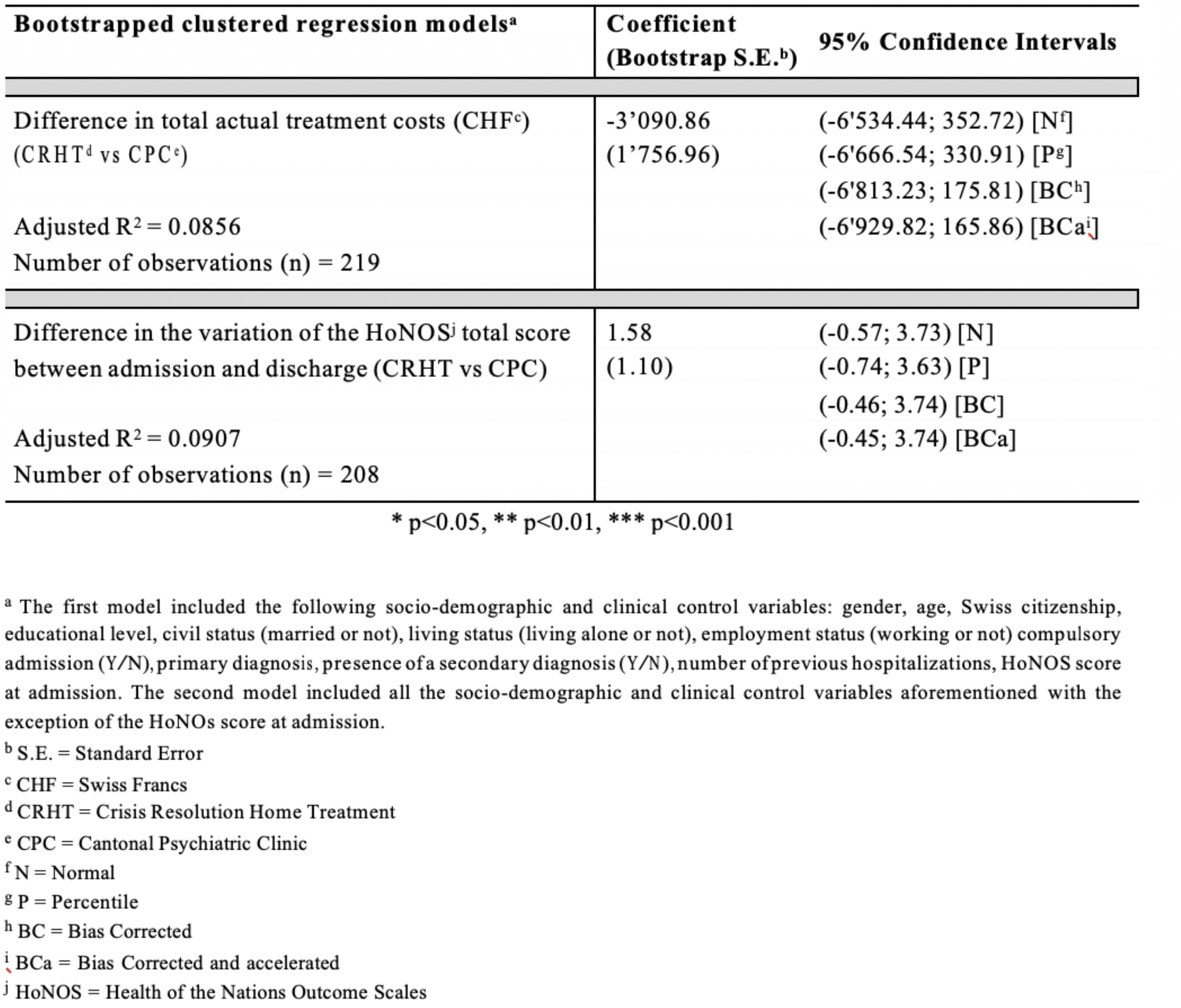
[20] The bootstrapped clustered regression model used to assess the difference in the average psychiatric symptoms variation at discharge between arms did not include as control variable the psychiatric symptoms level (HoNOS score) at admission in order to avoid endogeneity problems, since this measure is used to calculate the dependent variable of the model.

Table 10: Adjusted differences in mean costs and effectiveness measures for the treatment phase



Bootstrapped clustered regression models[a]	Coefficient (Bootstrap S.E.[b])	95% Confidence Intervals
Difference in total actual treatment costs (CHF[c]) (CRHT[d] vs CPC[e]) Adjusted $R^2 = 0.0856$ Number of observations (n) = 219	-3'090.86 (1'756.96)	(-6'534.44; 352.72) [N[f]] (-6'666.54; 330.91) [P[g]] (-6'813.23; 175.81) [BC[h]] (-6'929.82; 165.86) [BCa[i]]
Difference in the variation of the HoNOS[j] total score between admission and discharge (CRHT vs CPC) Adjusted $R^2 = 0.0907$ Number of observations (n) = 208	1.58 (1.10)	(-0.57; 3.73) [N] (-0.74; 3.63) [P] (-0.46; 3.74) [BC] (-0.45; 3.74) [BCa]

* p<0.05, ** p<0.01, *** p<0.001

[a] The first model included the following socio-demographic and clinical control variables: gender, age, Swiss citizenship, educational level, civil status (married or not), living status (living alone or not), employment status (working or not) compulsory admission (Y/N), primary diagnosis, presence of a secondary diagnosis (Y/N), number of previous hospitalizations, HoNOS score at admission. The second model included all the socio-demographic and clinical control variables aforementioned with the exception of the HoNOs score at admission.

[b] S.E. = Standard Error

[c] CHF = Swiss Francs

[d] CRHT = Crisis Resolution Home Treatment

[e] CPC = Cantonal Psychiatric Clinic

[f] N = Normal

[g] P = Percentile

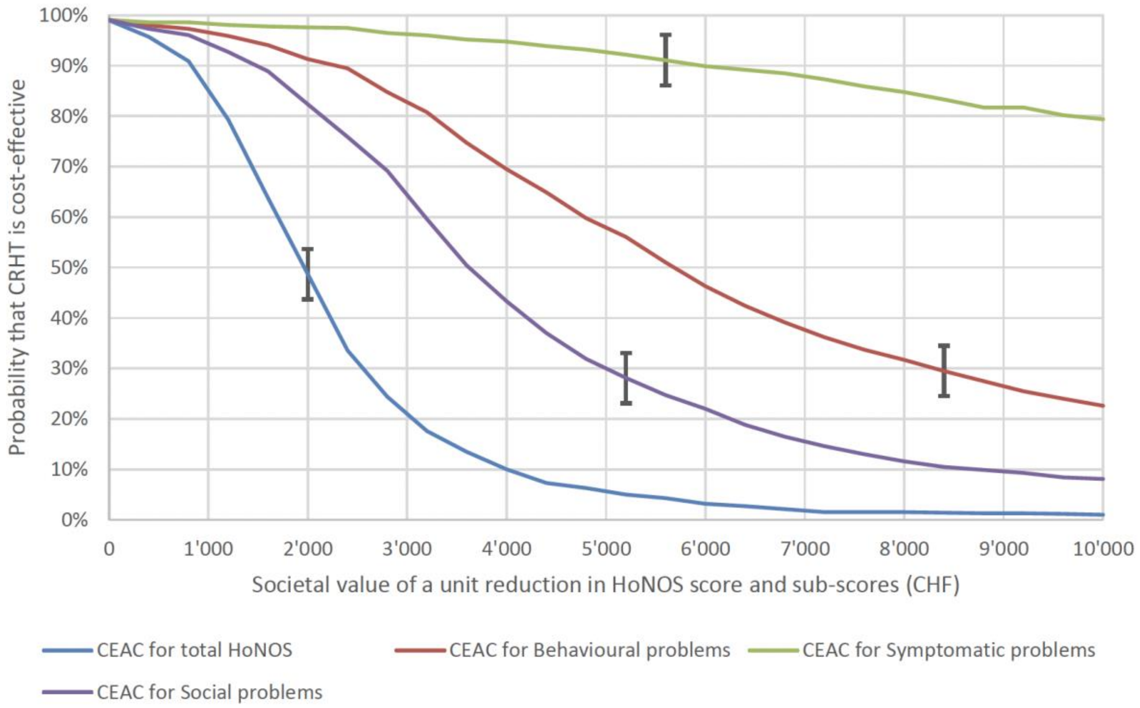
[h] BC = Bias Corrected

[i] BCa = Bias Corrected and accelerated

[j] HoNOS = Health of the Nations Outcome Scales

The researchers also report the CEACs for the treatment phase; they estimated net benefits for all patients in the two arms for values of λ ranging from CHF 1 to CHF 10'000 in CHF 400 increments (Figure 4 below). Together with the CEAC calculated using the variation in the total HoNOS score at discharge, they also reported the CEACs for the variations in three HoNOS subscales (i.e.: behavioral problems, symptomatic problems and social problems) to provide a more detailed assessment. A threshold black line was drawn on each of the curves, representing the monetary societal value from which, on average, the NB becomes positive. Cost- effectiveness should be interpreted from the threshold values on, where the societal benefit overcomes the costs of treatment. If considering the total HoNOS score, CRHT was not cost-effective for positive NBs (the probability of CRHT cost-effectiveness drops below 50% just before the threshold value). However, the researchers found a different picture for the three HoNOS subscales considered. CHRT is not cost-effective for the reduction of behavioral and social problems (in both cases the CRHT cost-effectiveness probability was below 30% after the threshold value), but highly cost-effective for the reduction of symptomatic problems (the CRHT cost-effectiveness probability was at least 80% after the threshold value).

Figure 4: Cost-Effectiveness Acceptability Curves (CEAC) for the treatment phase



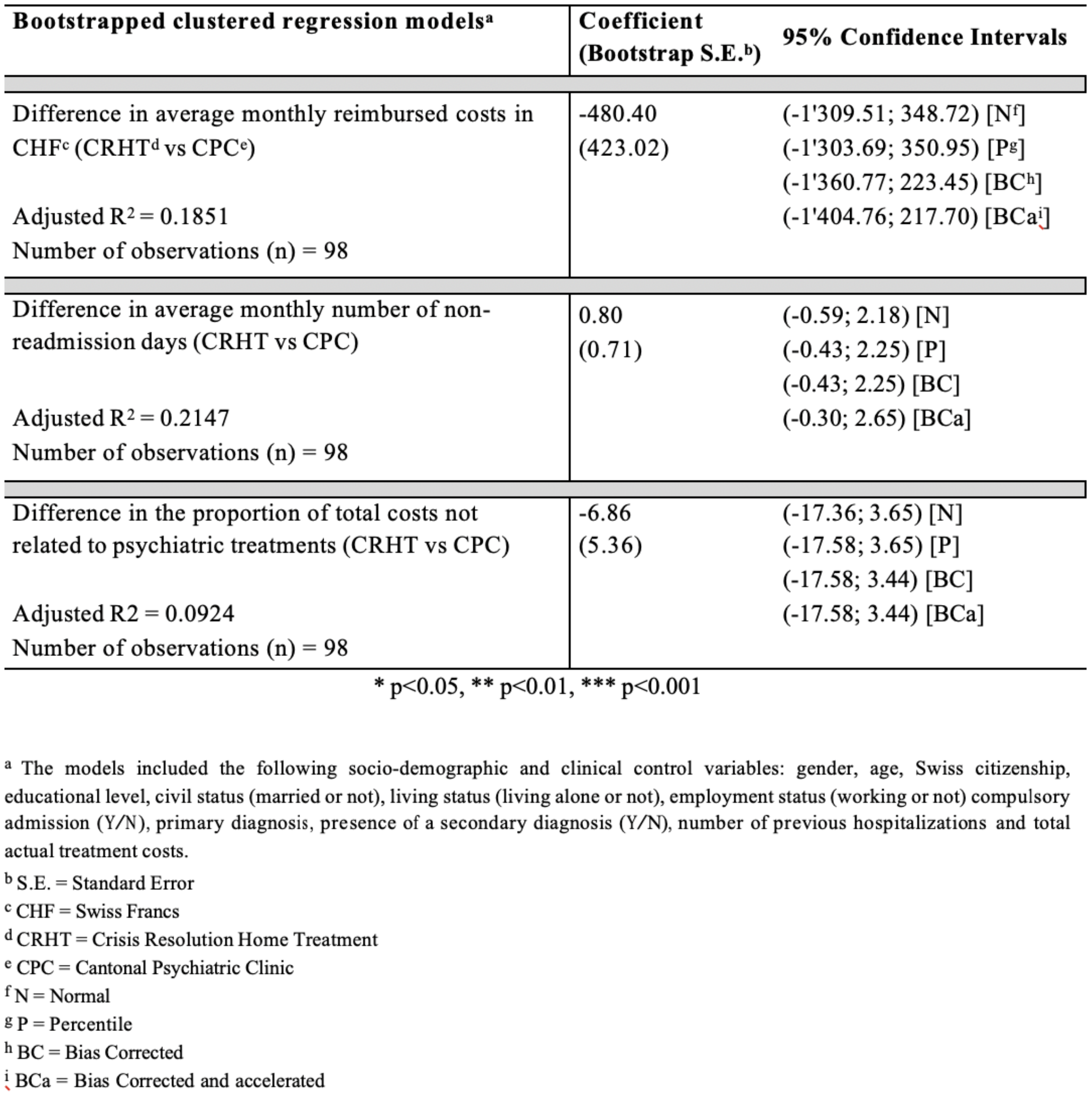
Follow-up phase analysis' results

Not all patients for which the health insurance companies provided cost data had a full follow-up of two years. Indeed, before the end of the follow-up period, four patients changed health insurers, three departed abroad and three died. The shortest follow-up period was 131 days (i.e. approximately 4½ months). To include also the patients without a full follow-up, the researchers used the average monthly follow-up costs and the average monthly number of non-readmission days for the analysis. Additional Figure 10 in Annex 2 shows the distributions of average monthly follow-up costs, average monthly number of non- readmission days and proportion of total costs not related to psychiatric treatments. Costs were strongly right-skewed and non-readmission days were strongly left-skewed. No particular skewness was remarked for the proportion of total costs not related to psychiatric treatments.

The unadjusted mean of the average monthly follow-up costs did not differ significantly between groups at the 5% level (CRHT: 1'877.37 CHF vs CPC: 2'730.93 CHF; p-value=0.062), but using 90% confidence intervals it was significantly lower for the intervention group. The unadjusted mean of the average number of non-readmission days resulted higher in the intervention group (CRHT: 29.00 days vs CPC: 27.96 days; p-value=0.046). No significant difference between the two groups (CRHT: 58.36% vs CPC: 64.62%; p-value=0.134) was noticed for the proportion of total follow-up costs not related to psychiatric treatments (see Additional Table 14 in Annex 2).

Table 11 indicates that the adjusted mean differences between the two groups concerning average monthly follow-up costs (-480.40 CHF on average for CRHT; p-value=0.256), average number of non-readmission days (+0.80 on average for CRHT; p-value=0.260) and proportion of total follow-up costs not related to psychiatric treatments (-6.86% on average for CRHT, p-value=0.201) were not statistically significant.

Table 11: Adjusted differences in mean costs an effectiveness measures for the follow-up phase



Bootstrapped clustered regression models[a]	**Coefficient (Bootstrap S.E.[b])**	**95% Confidence Intervals**
Difference in average monthly reimbursed costs in CHF[c] (CRHT[d] vs CPC[e]) Adjusted $R^2 = 0.1851$ Number of observations (n) = 98	-480.40 (423.02)	(-1'309.51; 348.72) [N[f]] (-1'303.69; 350.95) [P[g]] (-1'360.77; 223.45) [BC[h]] (-1'404.76; 217.70) [BCa[i]]
Difference in average monthly number of non-readmission days (CRHT vs CPC) Adjusted $R^2 = 0.2147$ Number of observations (n) = 98	0.80 (0.71)	(-0.59; 2.18) [N] (-0.43; 2.25) [P] (-0.43; 2.25) [BC] (-0.30; 2.65) [BCa]
Difference in the proportion of total costs not related to psychiatric treatments (CRHT vs CPC) Adjusted R2 = 0.0924 Number of observations (n) = 98	-6.86 (5.36)	(-17.36; 3.65) [N] (-17.58; 3.65) [P] (-17.58; 3.44) [BC] (-17.58; 3.44) [BCa]

* $p<0.05$, ** $p<0.01$, *** $p<0.001$

[a] The models included the following socio-demographic and clinical control variables: gender, age, Swiss citizenship, educational level, civil status (married or not), living status (living alone or not), employment status (working or not) compulsory admission (Y/N), primary diagnosis, presence of a secondary diagnosis (Y/N), number of previous hospitalizations and total actual treatment costs.

[b] S.E. = Standard Error

[c] CHF = Swiss Francs

[d] CRHT = Crisis Resolution Home Treatment

[e] CPC = Cantonal Psychiatric Clinic

[f] N = Normal

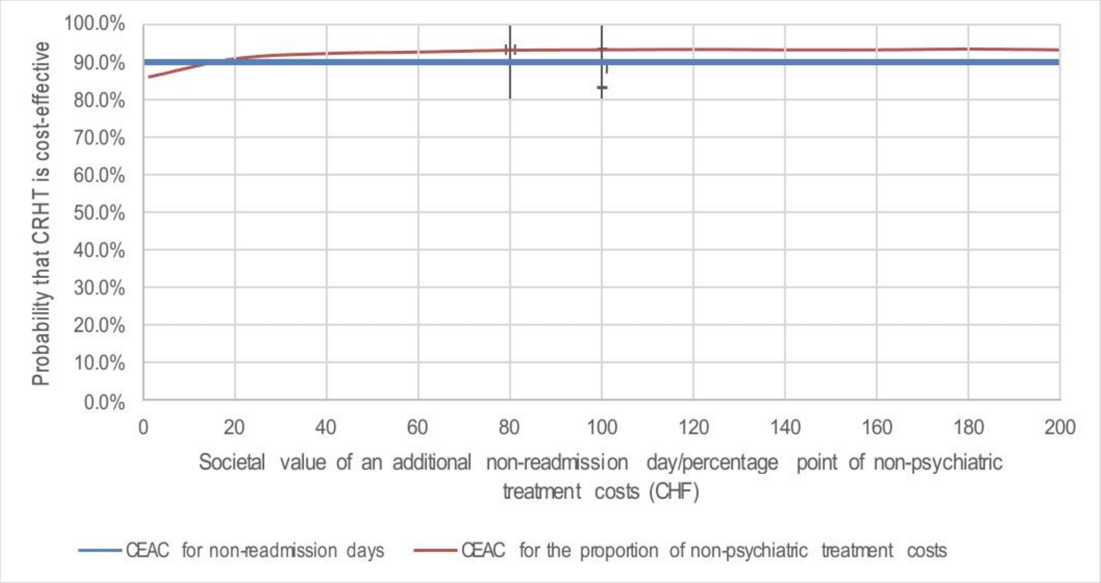
[g] P = Percentile

[h] BC = Bias Corrected

[i] BCa = Bias Corrected and accelerated

Finally, Figure 5 illustrates the CEACs for the follow-up period. The researchers estimated net benefits for all patients in the two arms for values of λ ranging from CHF 1 to CHF 200 in CHF 20 increments. Both CEAC showed a slight increasing trend and reported high cost-effectiveness probabilities of CRHT (always above 85%) before and after the threshold values.

Figure 5: Cost-Effectiveness Acceptability Curves (CEAC) for the follow-up phase



The black line reported on each of the curves represents the monetary societal value from which, on average, the Net Benefit becomes positive.

5.6.4 Conclusions for Implementation

The treatment phase analysis showed that CRHT is essentially less costly than standard inpatient treatment. However, CRHT cost-effectiveness strongly depends on the type of psychiatric symptoms considered. It should be noted that the lack of cost-effectiveness concerning behavioural and social problems may be related, at least in part, to inclusion/exclusion criteria (especially for behavioural problems) and to different treatment settings (CRHT patients need to have a stable living environment with good relationships with family members).

When considering the follow-up period, the researchers consider CRHT is both basically less costly and cost-effective in comparison with standard hospitalization. CRHT appears therefore to be a promising treatment option that deserves to be implemented and developed to a larger scale. In this sense, the results of this study call for further research on the factors (i.e., primary diagnosis, importance of different psychiatric symptoms, clinical history, age, gender, etc) related to the effectiveness and cost-effectiveness of CRHT, in order to provide important recommendations useful to optimize the choice of the treatment option. The forthcoming results of a grounded theory study on CRHT in Ticino will help provide important and detailed elements for the evaluation of this complex intervention. Once the researchers have completed the three parts of their research, they will proceed with the dissemination of results with the goal of extending the accessibility of CRHT to the entire population of Ticino and to possibly impact the legislation of other cantons as well.

6. Conclusion: Four broad recommendations to advance health care in Switzerland

Summary

The NRP 74 aims to strengthen the base of evidence for decision-making in the Swiss health care system. As shown in the last chapter, the projects presented here can contribute to this in the area of cost and reimbursement, on varying levels depending on their main objectives.

Four fields of action

In this chapter, we present recommendations in four fields of action based on the NRP 74 project results, project leader interviews and discussions within the synthesis team and with stakeholders. The main conclusions derived from these findings and exchanges are:

- **Coordinated and integrated care should be strengthened. (Chapter 6.1)**
- **Gatekeeping should be enhanced. (Chapter 6.2)**
- **Efforts to improve the quality of health care services should be supported. (Chapter 6.3)**
- **The reimbursement system should be reformed. (Chapter 6.4)**

In summary, a properly designed reform of the reimbursement system is essential. Its main objective must be to intensify the incentives for health care providers to strengthen coordination, gatekeeping, and quality. The reform of the reimbursement system is seen as one of the driving factors and as having a major impact on all other aspects influencing the efficiency of the health care system.

Some aspects and issues of implementation

Regarding the implementation of the single recommendations, chapter 6.5 summarizes the feedback on hindering or facilitating factors provided by key stakeholders at a dialogue event in summer 2021.

6.1 Coordinated and integrated care should be strengthened.

The findings presented above clearly indicate that low continuity of care, which is an important element of integrated care, is associated with higher costs. This can be expected and is well documented in the literature as redundant diagnostics and needless waiting times lead to unnecessary worsening of health conditions and high costs. In particular, project 32 shows that discontinuity of care can lead to severe consequences for quality, cost and efficiency. Consequently, improving continuity of care has the potential to improve the health care system significantly. In addition, project No. 13 underlines that a focus on continuity of care after retiring of physicians or practice closures is highly relevant for quality, cost and efficiency. Other principal investigators during the interviews supported the relevance of integration and coordination along the treatment chain as an instrument to improve the quality and cost-effectiveness of treatment for patients.

These findings give new evidence to an aspect of recommendation M10 ("Strengthen coordinated care") of the Expert Report. Improving care coordination is listed as a priority in the Federal Council's Health 2020 Report stating that well-coordinated care can lead to improvements in the efficiency and quality of care, as well as the cost-effectiveness of treatments. Patients with complex needs requiring multiple health services are seen as a particularly important group who can benefit from improved care coordination.

Consequently, based on these findings and our reading of the literature, we call for the following actions:

On the policy level

- Strengthen networks of physicians and other service providers.
- Improve the continuity of care after the retirement of physicians by means of careful strategic planning by physician associations.
- Continuity of care, coordination and integration should be sufficiently financed, i.e., the reimbursement of coordination and integration services should not be lower than for other medical functions.

On the management level

- Physicians should plan their retirement strategically to ensure the continuity of care for their patients.
- Avoid double diagnostics through improved information transfer and digital platforms

On the personal interaction level

- Physicians should provide consultancy on continuation of care to their patients.
- Retiring physicians must inform their patients, especially the chronically ill, about the importance of the continuity of care and recommend suitable replacements.

6.2 Gatekeeping should be enhanced.

As project No. 32 shows, gatekeeping is associated with a reduced number of caregivers within the service chain, improved quality and fewer costs. Project No. 13 has a strong focus on the impact of gatekeeping. It emphasizes that primary care providers play a key role as gatekeepers in the Swiss health care system and are crucial for the efficiency of the entire system. First line contacts can improve the efficiency of the entire service chain, i.e., their influence goes beyond primary care. The gatekeeper is instrumental in avoiding multiple unnecessary examinations resulting from referrals.

These findings align with recommendation M27 (“commitment to gatekeeping”) of the Expert Report. The gatekeeper is like a manager of the entire diagnostic and treatment process, keeping an oversight over all developments and preventing the patient from seeking treatment at different disconnected sources. This can reduce unnecessary costs, loss of information as well as dangerous and redundant diagnostics and treatment. Consequently, the projects No. 32 and 13 of NRP 74 research provide evidence towards recommendation M27, but also the PI of project No. 23 underlined its relevance during our interviews.

Consequently, based on these findings and our reading of the literature, we call for action as follows:

On the policy level

- Efforts to improve the role of gatekeeping in mandatory health insurance should be supported.
- The number of physicians in each canton should be actively regulated.
- The geographic distribution of physicians should be strategically planned.
- The gatekeeper function should be sufficiently financed, i.e., the reimbursement of exerting a gatekeeper function should not be lower than for other medical functions.

On the management level

- The importance and attractiveness of primary care among young physicians and students of medicine should be strengthened.
- Training of physicians should prepare medical students for their role as gatekeepers.

On the personal interaction level

- Physicians must actively exert their role as gatekeepers.

6.3 Efforts to improve the quality of health care services should be supported.

It is obvious that quality of care is a cornerstone of the entire health care system. Several NRP 74 projects have therefore directly examined quality of care issues, and there is a separate Synthesis Working Paper on this topic.[21] However, quality is not only a crucial output of the system but is also intertwined with the efficiency of the entire system as well as cost and reimbursement. The projects analysed in this paper also provide evidence for the role of quality within the economic dimension of health care.

Projects No. 23 and No. 2 demonstrate that quality is not only the result of an independent treatment process. Instead, there are different determinants of quality, such as financial incentives, participatory methods and reimbursement structures which recognize the element of time invested by primary care physicians. Project No. 23 tested whether the behaviour of physicians can be influenced by chances of increasing their income but found that financial incentives were not the only factor influencing behaviour resulting in higher quality. Additionally, project No. 2 proposes that quality metrics driven by participatory methods have the potential to change primary care physicians' practices.

The relation between quality of care and cost as well as reimbursement is also underlined by recommendation M19 ("Strengthen quality") of the Expert Report. The focus of M19 is on the avoidance of injurious incidents and expensive damage caused by medical actions due to poor therapeutic quality. However, quality is more than patient safety, i.e., quality and costs are elements of a circle. Financial incentives might increase health care costs slightly, but they will – rationally invested – increase the quality of services resulting in less treatment and costs.

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[21] See NRP 74 Programme Synthesis Working Paper "Quality of care".

Consequently, based on these findings and our reading of the literature, we call for action as follows:

On the policy level

- Efforts to improve quality of care and patient safety should be strengthened and sufficiently financed.
- National standards of quality of care should be developed and introduced.
- Tariff-based incentives for high-quality treatments should be introduced if complemented with other quality measures.

On the management level

- Quality indicators should be defined and implemented on all levels of health care.
- Quality must be realized as an essential dimension of health care and as a determinant of cost and reimbursement.
- Clinical routine data must be available electronically.

On the personal interaction level

- The individual and subjective quality of care must be at the centre of physician-patient-interaction in order to avoid unnecessary and dangerous diagnostics without realizing the underlying problem of the patient.
- Participatory physician-patient decision-making must be supported to help improve care quality in primary care practices

6.4 The reimbursement system should be reformed.

As shown in chapter 2.3, a reimbursement scheme defines the way health care services are paid for. As in many countries, the Swiss reimbursement system of health care services distinguishes between outpatient and inpatient services. Independent physician practices mainly take care of the outpatients and are financed on a fee-for-service basis, while inpatient hospital services are reimbursed through a prospective diagnosis-based system (DRG). There is evidence from the literature that the reimbursement system has a major impact on cost and efficiency. For instance, national and international studies have shown that physicians change their behaviour if incentives set by the reimbursement system change.

NRP 74 projects No. 12 and 2 address issues of reimbursement of the outpatient sector. Project No. 12 demonstrated that Swiss physicians responded to financial incentives. The number of patients treated, the time of treatment, the number and kind of diagnostics (in particular expensive examinations, such as imaging) etc. depend on the incentives set by the reimbursement system. Thus, policymakers can have an impact on the costs and the efficiency of the health care system by implementing an adequate reimbursement system.

Consequently, based on these findings and our reading of the literature, we call for action as follows:

On the policy level

- Given that the reimbursement system is a central cornerstone of the entire health care system, tariffs should be analysed and re-regulated regularly.
- Selective contracting between health insurers and care providers should be explored in the Swiss context.
- Pay-for-performance should be further piloted in various settings and the results should be analysed to confirm their relevance for Switzerland.

On the management level

- Overtreatment could be reduced by mixed tariffs including flat-rate elements in ambulatory care, in particular for chronically ill patients.

On the personal interaction level

- Free contracting between health insurances and health care providers should be allowed.

6.5 Implementation aspects raised by stakeholders

On 28 June 2021, the Synthesis Team presented parts of its conclusions to key stakeholders. The online event was attended by 13 representatives of a diverse panel of stakeholder organisations. The aim of the event was to gather the stakeholders' feedback on some of the insights and recommendations developed and formulated by the Synthesis Team and discuss them regarding their implementability. The presentations and discussions mainly focused on two recommendations/topics:

- Gatekeeping should be enhanced.
- The reimbursement system needs to be reformed.

The conclusions of the Synthesis Team meet with broad approval and many suggestions to increase their practical application were made. The most important of these are summarised below.

6.5.1 Implementation aspects with regard to gatekeeping

While gatekeeping was considered important, several stakeholders noted that the current potential in this area may already be largely exhausted. This because a lot is already done in this regard, while the further scope for improvement appears to be limited after the rejectionoftheso-called "managed care" bill in a national vote.

It was pointed out on several occasions that the term gatekeeping is problematic in itself, as it is usually understood by many lay people as being a control mechanism used by insurance companies, not least to withhold essential services from patients. Hence, on one hand, it is important to better explain the concept, and, on the other, to find alternative terms emphasising the coordination or accompaniment aspect. One possible term could be "scouting". After all, gatekeeping emcompasses the empowerment of physicians and patients to select the best diagnosis and treatment and to avoid unnecessary and dangerous double-diagnoses.

All participants emphasised the important role GPs play in gatekeeping, but it also became clear that other actors can and should take on this role, not least because GPs are scarce. Spitex or health centres were mentioned as possible actors to be put in charge of case management.

6.5.2 Implementation aspects regarding the reform of the reimbursement system

There was consensus among stakeholders that major changes in the reimbursement system in primary care are necessary. However, the biggest project in this area in recent years, the introduction of TARDOC, has been dragging on for some time. Several stakeholders expressed the view that more pressure is needed from the political side. This mainly because the multitude of diverging (economic) special interests on the health care providers' side prevent a common view on reform issues and thus hinder innovation.

And while the need for reform itself is generally confirmed, the stakeholders urge caution when it comes to introducing new mechanisms. On the one hand, the overall system is already enormously complex, so that simplification could be more helpful than introducing additional elements. For this reason, some stakeholders are critical of the introduction of the experimental article as envisaged in the first package of measures for cost containment proposed by the Federal Council in its current KVG reform project. Others, however, see it as central to moving forward at all. They emphasise that it is important to be able to test new approaches in smaller pilot projects before rolling them out across the entire system. Because on a large scale, even small mistakes could lead to very high costs.

Finally, the stakeholders identified the availability of good data at various levels as a prerequisite for evidence-based reforms and the monitoring of their effectiveness. However, as the data basis is inadequate in many areas, a continuous revision of the reimbursement system seems impossible as long as the quality and interconnectedness of health economic data in Switzerland is not increased.

7. Further fields of action in which measures should be explored

Summary

This chapter presents fields of action and recommendations, which should be considered and further clarified, but which are not directly linked to evidence from the research results.

Further insights contributing to current policy discussions

From the analysis of projects, discussions with PIs and exchanges with stakeholders, several fields of action have emerged which are significant for the costs of the health care system but are not directly underpinned by research results. We recommend measures in these fields of action to be explored by means of further studies and pilot projects. The following fields of action are concerned: Health Literacy; Health Financing; Efficiency of Health Care Markets; Piloting and Experimenting; and Transparency.

Last but not least: Take-aways for strengthening future research

Finally, reflecting on the research experience gained within the NRP 74, some important insights about further steps necessary to strengthen health care research in the future can be formulated. In particular we call for an improved availability of routine (health economics) data for research and for the establishment of a strong research community in the field of health economics/health management in Switzerland.

7.1 Fields of action relating to cost and reimbursement

7.1.1 Health Literacy

The demand for health care services and the efficiency of the entire system depends on the health literacy of the population. A population with a high degree of health literacy will be more effectively preventing diseases, find the appropriate place of service and move within the service system avoiding overconsumption. While the projects referred to in this paper did not focus on health literacy, it still has an impact on the economic dimension of health care. Consequently, the PIs of the NRP 74 projects No. 2, No. 8 and No. 23 stated that their findings underline the relevance of health education and promotion. Thus, we do not provide new evidence in this field, but we believe that this general principle could be valid for Switzerland as well.

Consequently, based on these findings and our reading of the literature, we call for action in the following fields:

On a policy level

- Health education and promotion should be fostered and financed on all levels and for all age groups.

On a management level

- Physicians should appreciate mature patients taking responsibility for their own health.

On a level of personal interaction

- Shared decision-making between physicians and patients should be encouraged.

7.1.2 Health Financing

During interviews, two PIs recommended health-financing reforms. Without providing new evidence, we can state that they support the Expert Report concerning the recommendations M15 (“Promoting flat rates in the outpatient sector”), M25 (“Keep tariff structure up to date”), M22 (“Introduction of a flat reimbursement system/reference price system”) and M26 (“Uniform financing of packaged services in the hospital and outpatient sector”).

Based on the clear statements from the principal investigators but without providing further evidence in these fields we recommend action in the following fields:

On a policy level

- Experiment with a mixed system of fee-for-service and flat rates in the outpatient sector
- Integrate in- and outpatient care, i.e., reduce the separation between health care sectors.

7.1.3 Efficiency of Health Care Markets

The studies presented in this paper as well as the interviews with the PIs clearly show that efficiency is the special dimension that economics can offer to the health care system. In addition to the recommendations given in chapter 6, our findings also support (with a lower degree of evidence) recommendations M07 (“Shift from stationary to ambulatory”) and M38 (“No double voluntariness with the electronic patient file”) of the Expert Report.

Consequently, based on these findings and our reading of the literature, we call for action in the following fields:

On a policy level

- Patients should be treated at the lowest effective level. Consequently, the focus must shift from inpatient to outpatient care.
- Rebates must foster treatment at lower levels of care.

On a management level

- Administration should be made as simple as possible. Digitalization should be used as far as possible to reduce unnecessary gathering of data.
- Data confidentiality within electronic patient files must be warranted, but at the same time, it must not prevent effective and efficient health care services.

On a level of personal interaction

- Primary physicians must determine the most effective and efficient pathway of treatment in accordance with their patients

7.1.4 Piloting and Experimenting

Most of the PIs explicitly stated that there is a need for more piloting and testing of health care processes in Switzerland. In many cases, we would have to know much more on determinants and effects of interventions, costs and reimbursements systems to make decisions impacting the lives of millions of citizens countrywide. Therefore, we support recommendation M02 (“Introduction of an “experimental article” in the KVG”) of the Expert Report.

Consequently, based on these findings and our reading of the literature, we call for action in the following fields:

On a policy level

- Clear decision-making channels should be created and resources made available so that the possibilities of the “experimental article” as approved by parliament can be used efficiently and to a sufficient extent by the research community.
- Generate incentives for piloting innovations in health care provision and financing.

On a management level

- Provide sufficient financing for piloting innovations in health care provision and financing.
- Provide sufficient financing to fill the gap between successful pilots and countrywide implementation.

7.1.5 Transparency

Several PIs stated that the transparency of the health care system should be improved such as calling for better availability of data for decision-making on all levels. This includes medical, institutional and political decision-making. All decisions should be based on sound data and made transparent. This goes in line with the recommendation M09 (“Strengthening the control of accounts”) of the Expert Report.

Consequently, based on these findings and our reading of the literature, we call for action in the following fields:

On a policy level

- Improve transparency and evidenced-based decision-making within the Swiss health care system

On a management level

- Invest in digitalization, health cloud technologies and transparent regulations.

On a level of personal interaction

- Physicians must provide their patients with relevant information to allow them to understand health care decisions.

7.2 Fields of action for strengthening future health care research

Discussions within the NRP 74 community on experiences with the research activity itself have revealed important steps that need to be taken to strengthen health care research in the future. The following topics were identified:

- *Availability of Routine Data:* In comparison to other countries, a lot of data on costs and health care use is available in Switzerland, e.g., insurance companies` claims data. However, not every researcher is aware of it and has access to it. There is a need to increase the transparency of processes of accessing health economic data and linking it to epidemiological data.
- *Health Economics Research:* While Swiss health economists provide a lot of evidence regarding the efficiency of the Swiss health care system, not every important aspect is covered. For these, evidence from other countries is interpolated to the Swiss system, which may not be entirely adequate due to differences across health care systems. Therefore, further support for health economic research is called for.
- *Health Business Research:* Switzerland is known for excellent business schools with an international reputation. However, the NRP 74 could not attract any of them to participate in the programme. This is surprising as the analysis of the technical efficiency of hospitals, homes for the elderly, physicians’ practices etc. would be in the domain of business research. It seems that there is a dichotomy between health systems and business research in Switzerland with a negative impact on efficiency of the health care systems in the country. Consequently, we call for initiatives for making health business research more attractive, especially with respect to a closer cooperation between health economics, health systems research and health business research. This could, for instance, be fostered by research programmes focusing on the intersection between these sciences.

- *Young Researchers:* Based on our analysis we can state that the number of scientists focusing on health economics and health business research is on a relatively high level but could still be improved. NRP 74 has strongly invested in the development of younger scientists, but this effort must be sustained to build-up a community of younger researchers who can contribute to the evidence-base of health care decisions. It is insufficient and not sustainable to invest in the EHCL-programme and -members unless we continue fostering these young scientists for more years beyond the NRP 74 and EHCL projects.

8. Outlook

Shortly after we had initiated the process leading to this Synthesis Working Paper, the Corona pandemic apparently changed the health care reality. Instead of focussing on chronic-degenerative diseases, an infectious disease dominated the daily work in health care facilities, attracted the attention of politicians and took over the health care communication. While NRP 74 targeted chronic-degenerative diseases, Covid-19 became top-priority and we had to ask ourselves whether the findings of our projects are still relevant in the year 2021 and beyond.

We are convinced that the research presented in this Synthesis Working Paper is even more relevant than before the pandemic. Firstly, Covid-19 frequently leads to chronic diseases, including coronary and neurological disorders requiring long-term therapy. The consequences of the so-called “Long-Covid” will remain a major challenge for patients, medical providers, insurances and policymakers long after the pandemic will have ended. It is already now visible that the diagnostics and treatment of these patients will require huge personnel and financial resources.

Secondly, the diagnostics and treatment of Long-Covid patients will happen within the Swiss health care system. Structures and processes of the existing system with their effectiveness, costs and inefficiencies will constitute the frame within which Long-Covid patients will find help. Physicians and hospitals, for instance, will be financed within the Tarmed and DRG-system – with all pros and cons partly discussed in this paper. Any action taken in these matters will be relevant for these patients as well.

Finally, the tremendous costs of acute and long-term Covid-19 stress even more the need of efficient use of health care resources. As shown in the introduction this Synthesis Working Paper, the call for efficiency is built on a simple ethical principle: efficiency saves resources, which can be used to improve the lives of human beings. The opposite would be the waste of resources – and that is the last what we can afford in the presence of a tremendously expensive pandemic. The recommendations given in this Synthesis Working Paper are instruments to improve the efficiency of the Swiss health care system. Thus, they are attempts to free resources to take better care of humans suffering from various diseases – including Covid-19.

We submit these recommendations humbly knowing that NRP 74 was not a health economic programme. Consequently, the projects presented here are limited in number and scope. From the very beginning of NRP 74 these few projects could cover only few elements of health economics. Thus, we cannot expect that the results presented in this paper could embrace the entire width and depth of health economics.

In addition, we know that health economics is only one dimension of the entire health care system. Consequently, the findings of this Synthesis Working Paper must be seen together with the findings of the other Synthesis Working Paper of NRP 74 to cover the whole picture. The project findings presented here are only a small component in the struggle for better health care – but an important one.

The Covid-19 pandemic with all its changes in the society and health care system has demonstrated that we live in a dynamic, complex and uncertain world. The elements of the society and the health care system are closely connected, but processes of mutual stimulation are very uncertain and frequently too complex to predict. This calls for a thorough analysis of the basic values, i.e., a focus on what is important for us to make wise decision in the shadow of complexity, dynamics and uncertainty. Our main value is the dignity of human beings – and efficiency is one instrument to protect the dignity by making the best use of scarce resources. This Synthesis Working Paper gives some recommendations to improve the efficiency of the health care system in the strife for better life for the population of Switzerland.

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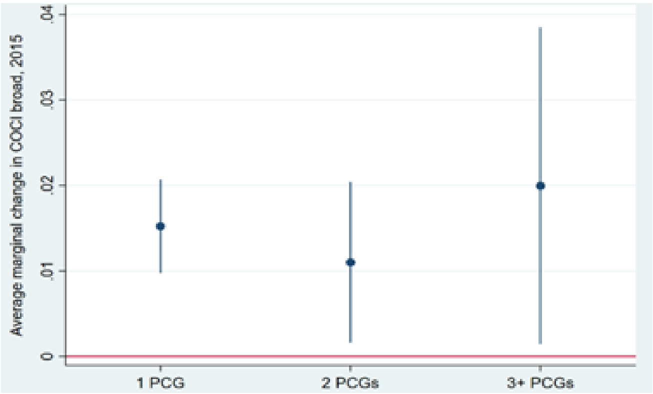
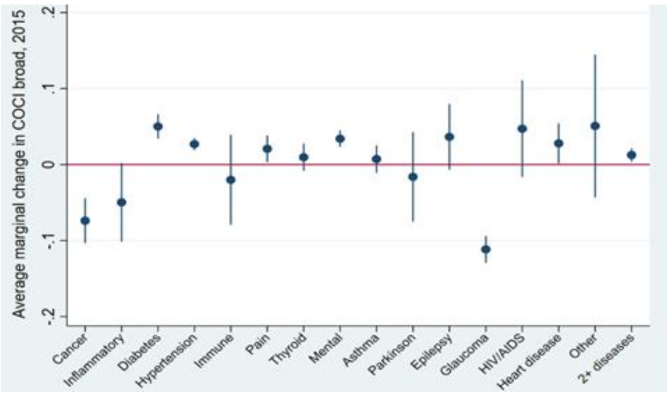
Annex 1 – Project number 32

Additional Figure 6: Average marginal effects in 2015 of various multimorbidity specifications on broad COCI (fully adjusted model)

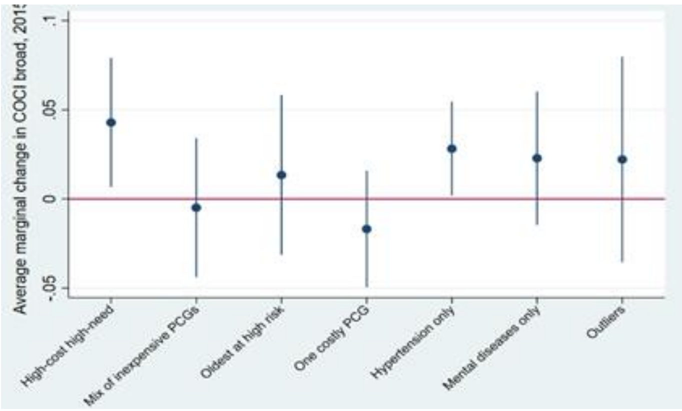
A) simple PCG counts approach



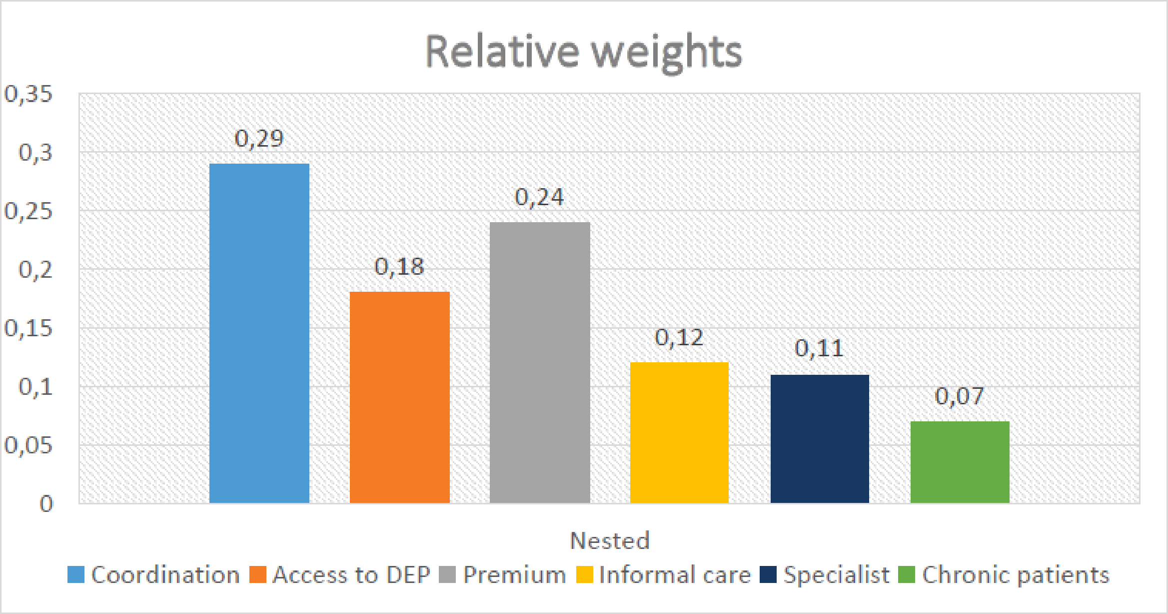
B) clinically relevant disease groups of PCGs (expert-based approach)



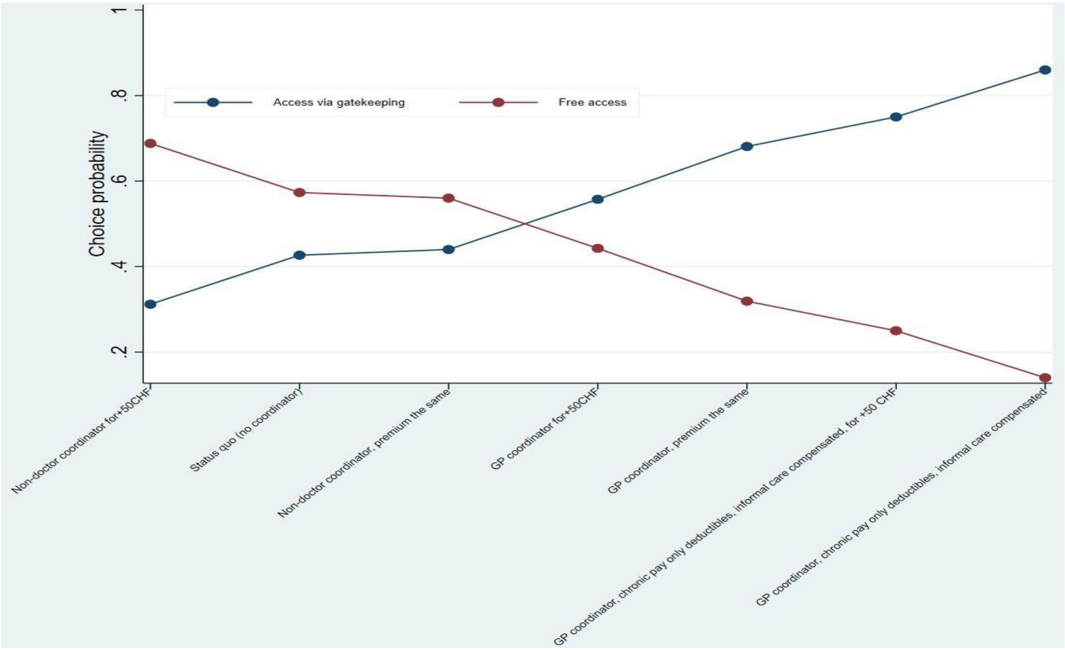
C) cluster analysis (data-driven approach)



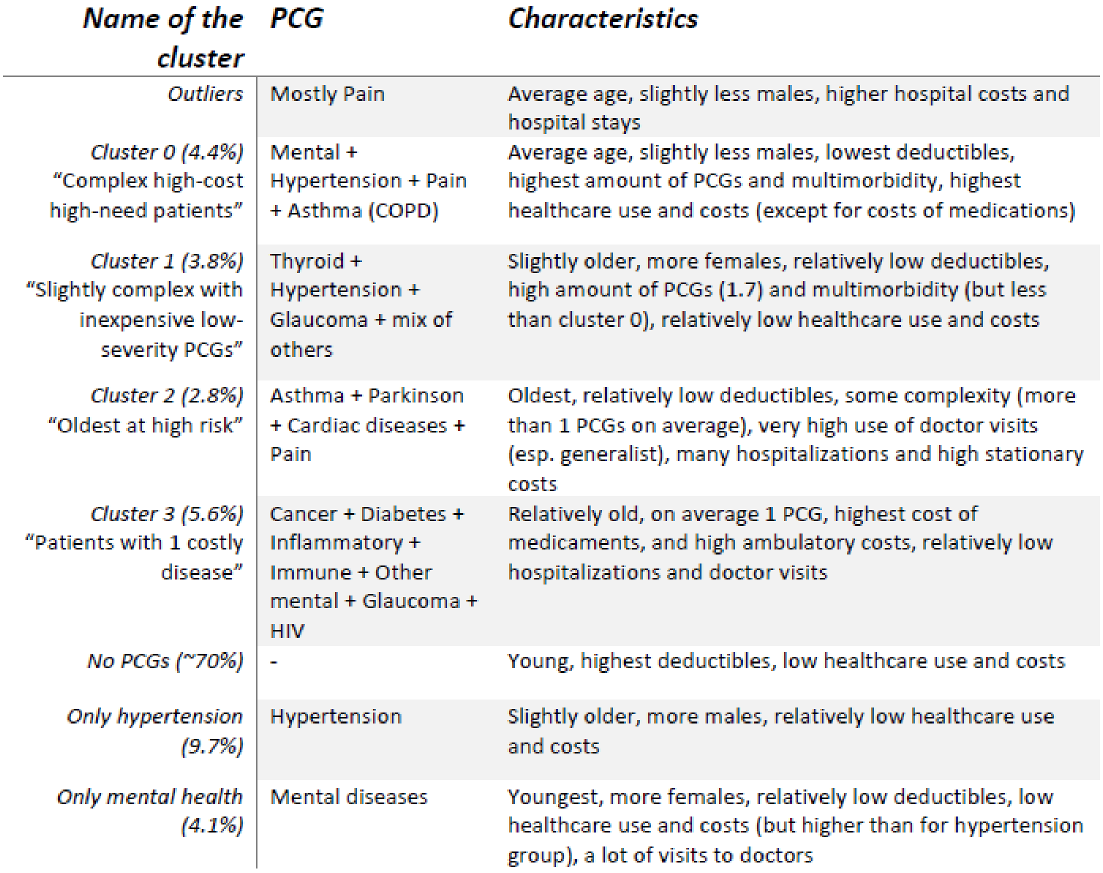
Additional Figure 7: Relative weights of attributes elicited from the main DCE study



Additional Figure 8: Choice probability of gatekeeping model under various scenarios



Additional Table 12: Interpretation of Clusters



Name of the cluster	*PCG*	*Characteristics*
Outliers	Mostly Pain	Average age, slightly less males, higher hospital costs and hospital stays
Cluster 0 (4.4%) "Complex high-cost high-need patients"	Mental + Hypertension + Pain + Asthma (COPD)	Average age, slightly less males, lowest deductibles, highest amount of PCGs and multimorbidity, highest healthcare use and costs (except for costs of medications)
Cluster 1 (3.8%) "Slightly complex with inexpensive low-severity PCGs"	Thyroid + Hypertension + Glaucoma + mix of others	Slightly older, more females, relatively low deductibles, high amount of PCGs (1.7) and multimorbidity (but less than cluster 0), relatively low healthcare use and costs
Cluster 2 (2.8%) "Oldest at high risk"	Asthma + Parkinson + Cardiac diseases + Pain	Oldest, relatively low deductibles, some complexity (more than 1 PCGs on average), very high use of doctor visits (esp. generalist), many hospitalizations and high stationary costs
Cluster 3 (5.6%) "Patients with 1 costly disease"	Cancer + Diabetes + Inflammatory + Immune + Other mental + Glaucoma + HIV	Relatively old, on average 1 PCG, highest cost of medicaments, and high ambulatory costs, relatively low hospitalizations and doctor visits
No PCGs (~70%)	-	Young, highest deductibles, low healthcare use and costs
Only hypertension (9.7%)	Hypertension	Slightly older, more males, relatively low healthcare use and costs
Only mental health (4.1%)	Mental diseases	Youngest, more females, relatively low deductibles, low healthcare use and costs (but higher than for hypertension group), a lot of visits to doctors

Annex 2 – Project number 8

Statistical analysis

Expecting a strong right skewness of the costs' distributions (and more in general a skewness in all distributions), mean costs and effectiveness measures' differences between CRHT and inpatient treatment were estimated using bootstrap resampling procedures with 1'000 repetitions. We used a bootstrapped t-test for unadjusted mean cost differences, and a bootstrapped clustered regression analysis for adjusted (according to the socio-demographic and clinical characteristics of the patients listed above) mean cost differences. To ensure the robustness of the estimate we calculated and compared four types of confidence interval, namely normal-based (N), percentile (P), bias-corrected (BC), bias-corrected and accelerated (BCa).

Cost-effectiveness analysis

The researchers computed cost-effectiveness of CRHT compared to hospitalization using the net benefit (NB) approach illustrated in the following equation:

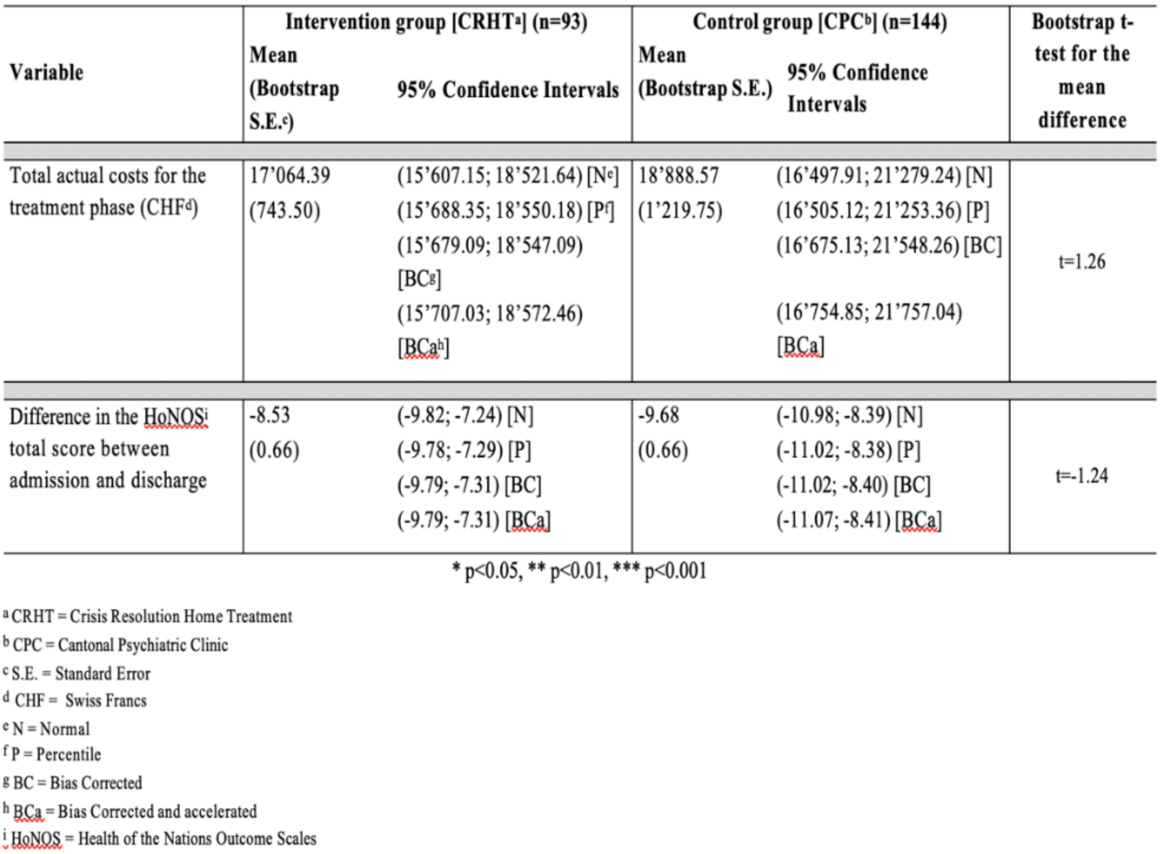
$$NB_i = \lambda \bullet E_i - TC_i$$

where *Ei* represents the effectiveness and *TCi* the treatment costs. The *NBi* was calculated for all available patients in three different settings according to the effectiveness measures and the costs considered:

- *E1* = HoNOS variation at discharge vs TC1 = total actual treatment costs,
- E2 = Number of non-readmission days during the follow-up vs TC2 = total reimbursed follow-up costs,
- E3 = Proportion of reimbursed costs not related to psychiatric treatments during the follow-up vs TC3 = total reimbursed follow-up costs.

The theoretical value that society attributes to a one-unit increase in effectiveness (i.e., a one-point reduction in the HoNOS for the treatment phase, and an additional non-readmission day/increase of one percentage point in the proportion of total costs not related to psychiatric treatments during the follow-up period) is given by λ and is unknown. The range and the increments of the values of λ were decided separately for the three settings aforementioned, according to the NB threshold values (i.e. the values from which, on average, the societal benefit becomes greater than the costs, providing positive NBs). We then used a bootstrapped clustered regression model with 1'000 repetitions to determine the mean net benefit difference between CRHT and hospitalization, controlling for the socio-demographic and clinical characteristics of the patients listed above (for the follow-up period cost-effectiveness analysis, the HoNOS score at admission was substituted by treatment total costs). For each model, we generated 1'000 regression coefficients for the treatment variable (i.e. a binary variable with 1=CRHT and 0=hospitalization); the proportion of coefficients greater than zero corresponded to the probability of CRHT to be cost-effective in comparison to hospitalization. These probabilities were used to build cost- effectiveness acceptability curves (CEAC).

Additional Table 13: Unadjusted differences in mean costs and effectiveness measures for the treatment phase



Variable	Intervention group [CRHT[a]] (n=93)		Control group [CPC[b]] (n=144)		Bootstrap t-test for the mean difference
	Mean (Bootstrap S.E.[c])	95% Confidence Intervals	Mean (Bootstrap S.E.)	95% Confidence Intervals	
Total actual costs for the treatment phase (CHF[d])	17'064.39 (743.50)	(15'607.15; 18'521.64) [N[e]] (15'688.35; 18'550.18) [P[f]] (15'679.09; 18'547.09) [BC[g]] (15'707.03; 18'572.46) [BCa[h]]	18'888.57 (1'219.75)	(16'497.91; 21'279.24) [N] (16'505.12; 21'253.36) [P] (16'675.13; 21'548.26) [BC] (16'754.85; 21'757.04) [BCa]	t=1.26
Difference in the HoNOS[i] total score between admission and discharge	-8.53 (0.66)	(-9.82; -7.24) [N] (-9.78; -7.29) [P] (-9.79; -7.31) [BC] (-9.79; -7.31) [BCa]	-9.68 (0.66)	(-10.98; -8.39) [N] (-11.02; -8.38) [P] (-11.02; -8.40) [BC] (-11.07; -8.41) [BCa]	t=-1.24

* p<0.05, ** p<0.01, *** p<0.001

[a] CRHT = Crisis Resolution Home Treatment

[b] CPC = Cantonal Psychiatric Clinic

[c] S.E. = Standard Error

[d] CHF = Swiss Francs

[e] N = Normal

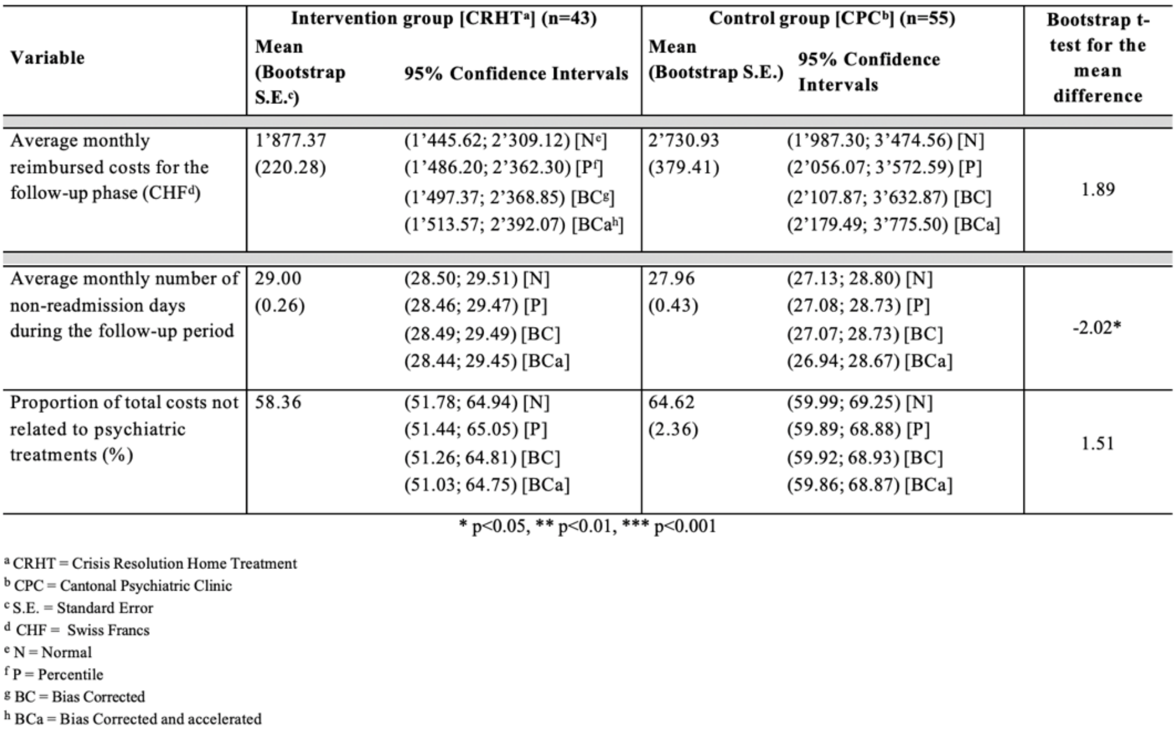
[f] P = Percentile

[g] BC = Bias Corrected

[h] BCa = Bias Corrected and accelerated

[i] HoNOS = Health of the Nations Outcome Scales

Additional Table 14: Unadjusted differences in mean costs and effectiveness measures for the follow-up phase



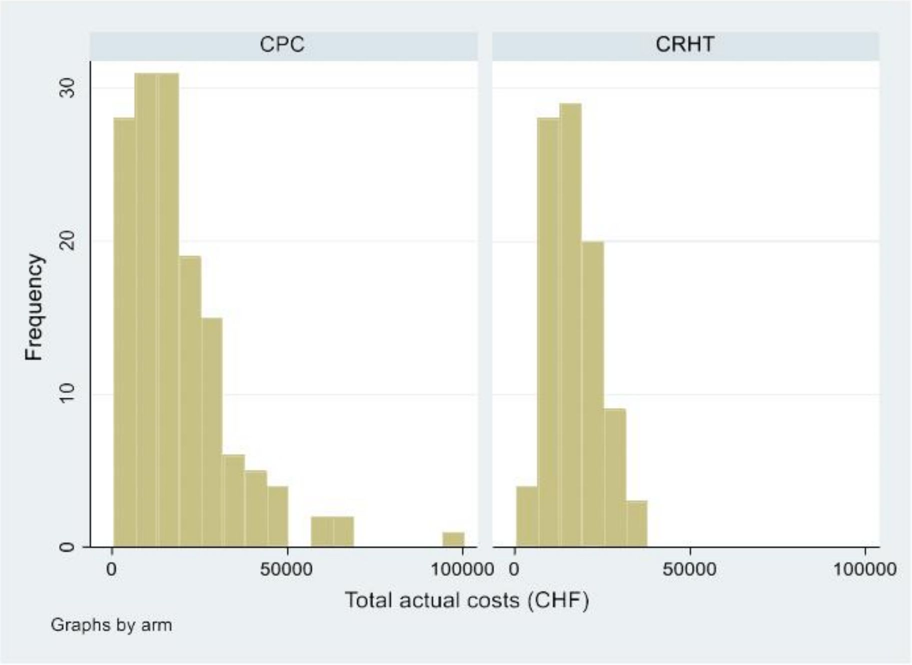
Variable	Intervention group [CRHT[a]] (n=43)		Control group [CPC[b]] (n=55)		Bootstrap t-test for the mean difference
	Mean (Bootstrap S.E.[c])	95% Confidence Intervals	Mean (Bootstrap S.E.)	95% Confidence Intervals	
Average monthly reimbursed costs for the follow-up phase (CHF[d])	1'877.37 (220.28)	(1'445.62; 2'309.12) [N[e]] (1'486.20; 2'362.30) [P[f]] (1'497.37; 2'368.85) [BC[g]] (1'513.57; 2'392.07) [BCa[h]]	2'730.93 (379.41)	(1'987.30; 3'474.56) [N] (2'056.07; 3'572.59) [P] (2'107.87; 3'632.87) [BC] (2'179.49; 3'775.50) [BCa]	1.89
Average monthly number of non-readmission days during the follow-up period	29.00 (0.26)	(28.50; 29.51) [N] (28.46; 29.47) [P] (28.49; 29.49) [BC] (28.44; 29.45) [BCa]	27.96 (0.43)	(27.13; 28.80) [N] (27.08; 28.73) [P] (27.07; 28.73) [BC] (26.94; 28.67) [BCa]	-2.02*
Proportion of total costs not related to psychiatric treatments (%)	58.36	(51.78; 64.94) [N] (51.44; 65.05) [P] (51.26; 64.81) [BC] (51.03; 64.75) [BCa]	64.62 (2.36)	(59.99; 69.25) [N] (59.89; 68.88) [P] (59.92; 68.93) [BC] (59.86; 68.87) [BCa]	1.51

* p<0.05, ** p<0.01, *** p<0.001

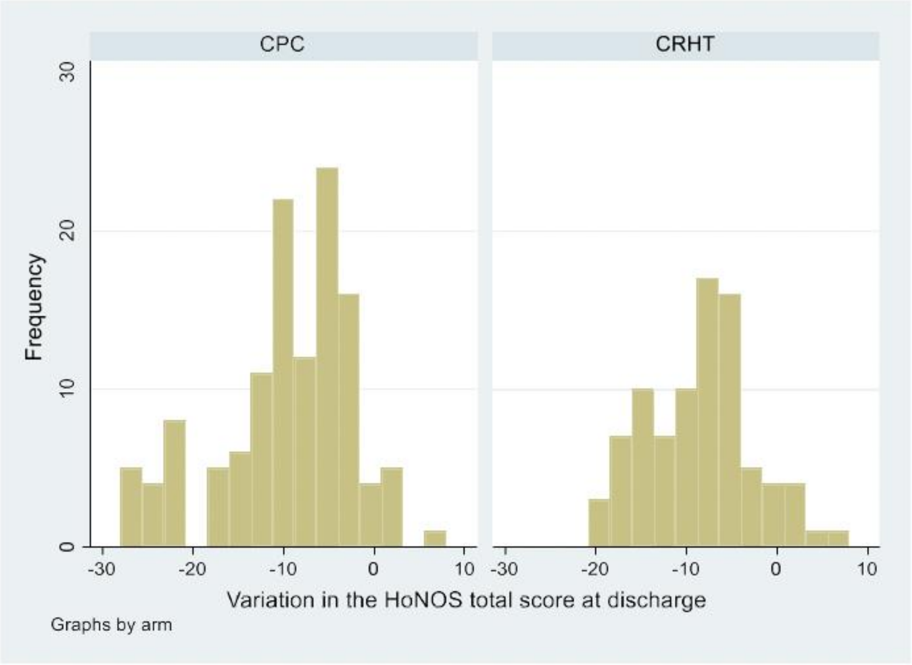
[a] CRHT = Crisis Resolution Home Treatment
[b] CPC = Cantonal Psychiatric Clinic
[c] S.E. = Standard Error
[d] CHF = Swiss Francs
[e] N = Normal
[f] P = Percentile
[g] BC = Bias Corrected
[h] BCa = Bias Corrected and accelerated

Additional Figure 9: Distribution of total actual costs and variation of psychiatric symptoms at discharge for the treatment phase

Total actual costs for the treatment phase

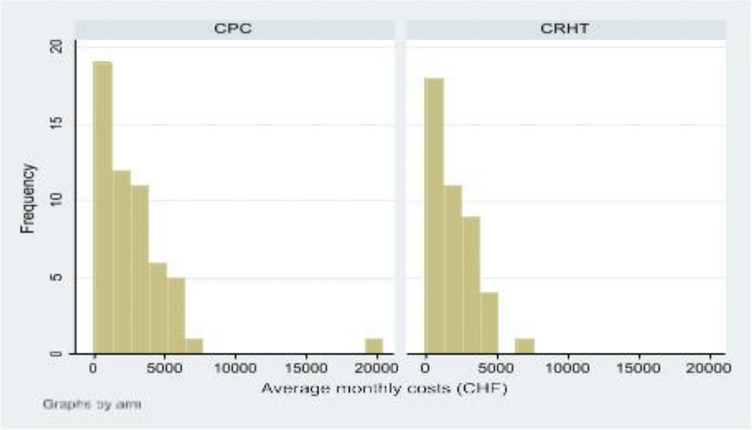


Variation of psychiatric symptoms (HoNOS total score) at discharge

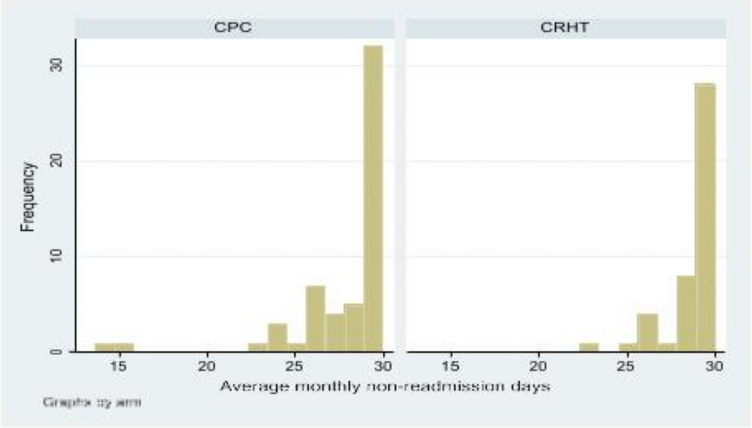


Additional Figure 10: Distributions of the average monthly reimbursed costs, number of non-readmission days and proportion of total costs not related to psychiatric treatments for the follow-up phase

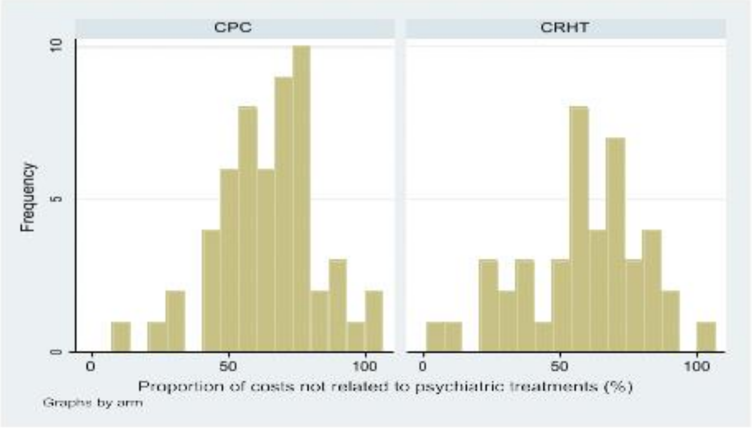
Average monthly reimbursed costs for the follow-up phase



Average number of non-readmission days for the follow-up phase



Proportion of reimbursed costs not related to psychiatric treatments for the follow-up phase



NRP 74 projects involved

NRP Project No. 2: Promoting participatory medicine in colorectal cancer screening (Reto Auer)

NRP Project No. 8: Cost effectiveness of home treatment for acute mental illness (Luca Crivelli)

NRP Project No. 12: Less fee-for-services, more flat reimbursement: Does it work in the out-patient sector? (Stefan Felder)

NRP Project No. 13: Physician retirement, practice closures and discontinuity of care: how does it affect patients' health care utilization and health related outcomes? (Michael Gerfin)

NRP Project No. 23: Impact of financial incentives to improve quality indicators in diabetic patients (Thomas Rosemann)

NRP Project No. 32: How to improve care coordination for people with chronic conditions in Switzerland? Project “COCONUTS” (Joachim Marti)

Glossary

The following definitions have been borrowed from National Library of Medicine, the Cochrane library, the British Medical Journal (BMJ), Center for Evidence-Based Medicine, WHO and the Federal Office of Public Health.

Amblyopia: The called lazy eye, is a disorder of sight in which the brain fails to process inputs from one eye and over time favours the other eye

Before-after design: A before-and-after study (also called pre-post study) measures outcomes in a group of participants before introducing a product or other intervention, and then again afterwards

Capitation: A fixed amount of payment per patient, per year, regardless of the volume or cost of services each patient requires

Complementary health insurance: It represents the insurance for co-payments, meaning that it insures the difference in price of a health service, covered by the compulsory health insurance, and the full price of the service.

Deductibles: the amount that people have to pay themselves before their reimbursement (or Mandatory Health Insurance) coverage kicks in

Diagnosis Related Groups (DRG): DRG is a patient classification system that standardizes prospective payment to hospitals and encourages cost containment initiatives

Difference in Differences estimation (DID): DID is a quasi-experimental design that makes use of longitudinal data from treatment and control groups to obtain an appropriate counterfactual to estimate a causal effect

Fee for service: Fee for service is a method of remuneration by which health providers are given payment in return for specific medical treatment

Fixed-effect models: The "fixed effects" model of meta-analysis assumes, often unreasonably, that the variability between the studies is exclusively because of a random sampling variation around a fixed effect

Flat rates: Instead of charging for each service provided, this tariff model is based on pre-set rates agreed upon between the health insurance companies and the care providers

Flat reimbursement: In a flat rate reimbursement situation a physician's salary is no longer paid for by reimbursements for each medical service they administer. Instead, it is made up of the flat fees paid for a patient no matter what medical care that patient uses

Global budget systems: Global budgets are an alternative payment model (specifically, a form of capitation) in which providers — typically hospitals — are paid a prospectively-set, fixed amount for the total number of services they provide during a given period of time

Grey reports / grey literature: refers to documents and other research-based material issued in limited amounts outside formal channels of publication and distribution. Examples include scientific and technical reports, government documents, doctoral theses and unpublished material

Health insurance premium: The payment individuals make to obtain health insurance

Health maintenance organization (HMO): An HMO is a prepaid health plan delivering comprehensive care to members through designated providers, having a fixed monthly payment for health care services, and requiring members to be in a plan for a specified period of time

Health technology assessment: is the systematic evaluation of the properties, effects and/or other impacts of health care technology. It is designed to provide objective information to support health care decisions and policymaking

Inpatient /stationary: An individual who has been admitted to a hospital or other facility for diagnosis and/or treatment that requires at least an overnight stay

Interrupted time series: a quasi-experimental design in which the effects of an intervention are evaluated by comparing outcome measures obtained at several time intervals before and several time intervals after the intervention was introduced

Managed care: Managed care is a health care plan that integrates the financing and delivery of health care services by using arrangements with selected health care providers to provide services for covered individuals

Managed competition system: It is defined as a purchasing strategy to obtain maximum value for consumers and employers, using rules for competition derived from microeconomic principles. A sponsor (either an employer, a governmental entity, or a purchasing cooperative), acting on behalf of a large group of subscribers, structures and adjusts the market to overcome attempts by insurers to avoid price competition.

Out-of-pocket payments: The portion of medical expenses a patient is responsible for paying

Outpatient / ambulatory: A patient who is receiving ambulatory care at a hospital or other facility without being admitted to the facility

Quality indicators: Quality indicators can be defined as measurable, objective indicators of the efficiency of the key segments of a system

Randomized controlled trial: A trial in which participants are randomly assigned to two or more groups: at least one (the experimental group) receiving an intervention that is being tested and another (the comparison or control group) receiving an alternative treatment or placebo. This design allows assessment of the relative effects of interventions

Reference price (fixed amount) system: To reduce utilization of pharmaceutical products, many countries have opted to use reference pricing. Reference pricing is a system where patient coinsurance payments depend not only on the price of the drug but also the price of alternatives therapies. As the name indicates, reference pricing sets patient coinsurance rates as the difference between the drug's retail or list price and the price of the "reference" product. Often a reference product will be a generic version of a product, or the most cost-effective molecule available in a class. Patients pay some portion of the difference between the drug's list price and the reference price

Selective contract schemes: In a selective contract, one or more medical provider (physicians, doctors' offices or hospitals) negotiate with one or more health insurance the payment of a specific treatment or diagnostics, which will be paid for all patients in this health insurance.

Spill-over effect: In economics, a spill-over is an economic event in one context that occurs because of something else in a seemingly unrelated context

Supplementary health insurance: This optional insurance covers a higher level of comfort (e.g., care in a semi-private or private hospital ward) or additional services and benefits (naturopathy, osteopathy, routine dental treatment, etc.). Premiums are risk-based. The health insurance fund may refuse to insure certain people or may attach conditions to the insurance policy because of the individual's state of health

Supplier- induced demand (SID): SID exists when the physician influences a patient's demand for care against the physician's interpretation of the best interest of the patient

TARDOC Suisse: TARDOC is the name of Switzerland's new physician tariff for the billing and reimbursement of outpatient medical services throughout the health care system

TARMED Suisse: TARMED Suisse is a company that is responsible for developing and updating the national tariff framework for ambulatory medical care provided by physicians and hospitals

Abbreviations and acronyms

AMI – Acute Myocardial Infarction

FFS – Fee for service

FMH – Foederatio Medicorum Helveticorum (The Swiss association of physicians)

FOBT – Faecal occult blood test

HDBSCAN – Hierarchical Density-Based Spatial Clustering of Applications with Noise

HiT – Health Systems in Transition

OECD – Organization for Economic Cooperation and Development

PBRN – Practice-based Research Network

PI – Principal Investigator

SCPC – Selective Contract for Paediatric Care

SHIS – Swiss Health Interview Survey