Regulating and nudging for improved societal impact of research-based knowledge in health care - The PINCH project

Summary

The PINCH project focuses on a research question that is of the utmost importance for society: How do we ensure that the knowledge generated by large investments in research reaches our end-users and generates societal impact in terms of improved health and increased productivity? In this production chain, the general practitioner (GP) is a crucial, but also a potentially weak link.

This project uses economic theory, behavioral economics, psychology and public administration science to establish a theoretical basis for exploring how research-based knowledge implementation is driven by GPs' personal characteristics, incentives, norms, and resource constraints.

We exploit current low- and high-powered natural experiments, introduce an RCT, and apply a multitude of data sources (including qualitative studies, survey data, data from clinical databases, and rich administrative data) to disclose evidence of a causal relationship between these factors and the propensity for a GP to implement research-based knowledge.

A novel feature of the PINCH project is that we explore factors that are external to the GP (e.g. payment schemes, networks, and workload) as well as factors, which are internal to the GP (e.g. their public sector motivation, intrinsic motivation, and user orientation), and explore interactions between these external and internal factors. Further, a unique feature of the PINCH project is that three current natural experiments are exploited to verify the impact of various types of policy instruments on implementation of research-based knowledge. We focus on the impact of monetary incentives, mandatory networking, and sudden increased workload on the equitable and timely implementation of research-based knowledge, and the associated socio-economic implications.

This project provides a unique opportunity to improve our understanding of how policy makers can influence health care professionals' behaviour to ensure optimal and equitable use of research-based knowledge.

Motivation

In Denmark it is increasingly acknowledged that research may generate significant innovations of great importance for societal welfare and growth. In this light, we have in latter decades observed an increased focus on funding strategies for research. However, policy-makers' focus has been largely on the input side in terms of ensuring sufficient resources for education and research activities. Much less attention has been given to the output side in terms of ensuring that knowledge is disseminated efficiently and equitably into society, leading to improved health, greater life opportunities, and increased job-market participation.

This research project's key hypothesis is that understanding both the barriers and facilitators to knowledge implementation is required to ensure use of research-based knowledge (RBK). In this project we study how factors affect decision-makers' propensity to engage in timely implementation of RBK. We explore the extent to which i) personal characteristics, ii) incentives, iii) norms, and iv) resource constraints hinder or facilitate the implementation of RBK. In order to establish evidence of causality, we exploit changes initiated by current natural experiments.

In this project, we focus on the general practitioner (GP) as our decision-maker. The justification for focusing on GPs as our case study is many-fold. Firstly, as GPs are gatekeepers to the specialised health care sector, and are in contact with 85% of the Danish population annually, their actions are crucial for ensuring societal welfare. Secondly, as GPs are often located away from knowledge generating institutions, the organisational structure characterising general practice is not ideal for ensuring efficient knowledge dissemination and implementation. Thirdly, GPs are required to have broad knowledge within many clinical (and social) areas, which increases the overall cost of updating the knowledge base. Although we focus on GPs, we are confident that our results will be generalizable to other principal–agent settings where the responsibility of knowledge implementation lies with individual

agents, but where regulators (principals) have some power to form incentives and regulations.

Background

As more than two million articles on medical issues are published annually (Balas and Boren, 2000), relying on the passive diffusion of RBK to health care professionals is ineffective. An analysis of the diffusion pattern of nine clinical procedures found that from the time of the publication of the landmark study it took on average 15.6 years for implementation to reach a level of 50% (Balas and Boren, 2000). The situation remains the same today. Several recent international and Danish studies (e.g. the Dartmouth Atlas of Health and the National Indictor Project) documents unexplained variation in health care delivery to identical patients within a very broad set of clinical areas (e.g Wennberg, 2010; Olsen et al, 2008, Epstein and Nicholson, 2009). Recently, Finkelstein et al (2016) found that 50-60% of variation in health care is generated by supply-side factors.

An overview of barriers for implementation of RBK by GPs is provided in two recent reviews (Zwolsman et al, 2012; Sadeghi-Bazargani et al, 2014). The most important barriers constitute lack of time and financial means for reading and appraising RBK and also for communicating RBK to patients. A recent study (Le et al, 2016) confirms these barriers in a Danish setting. The study finds that information-seeking strategies differ across GP characteristics.

A study of Danish GPs (Olesen et al, 2010) confirms that passive dissemination of guidelines is an insufficient route of influence, thus supporting Lomas' (Lomas, 1993) suggestion that in order to enhance the implementation of RBK policy-makers *must* improve their understanding of influences on practitioner behaviour, and become more willing to exploit those influences over which potentially they have some control. Lomas sketches a framework with four significant factors for analysing barriers and facilitators for use of RBK amongst physicians; *personal characteristics, incentives*, *norms,* and *resource constraints*. This framework constitutes the point of departure of this project.

Methods

The PINCH project constitutes four work-packages (WP). Each WP focuses on one factor from Lomas' framework and studies how it impacts on GPs' implementation of RBK, and the socio-economic consequences this may have.

The timing of the PINCH project offers a unique possibility to exploit three natural experiments generated by the 2018 national collective agreement for Danish GPs: the introduction of new capitation schemes (CAPITATION), the introduction of compulsory membership of peer networks (NETWORK), and moving the responsibility of 20,000 diabetes- and COPD patients monitored at hospital outpatient clinics into general practice (WORKLOAD). Further, we introduce an RCT (a NUDGE intervention) based on insights into behavioural economics.

The PINCH project will combine high-quality register data (e.g. National Health Service Register, National Danish Prescription Database, Danish National Patient Registry), data from clinical databases and survey data enabling a unique and in-depth understanding of GP behaviour, and the factors that drive/hinder the implementation of RBK. Outcome measures constitute a broad range of clinical outcomes as well as dimensions of socio-economic consequences such as use of hospital services, cost of medication, job market participation, and reduced mortality. A specific focus will be on improving equity in access to effective care across socio-economic strata.

Figure 1 provides an overview of the PINCH project.

***WP 1** - **P**ersonal characteristics*

This WP draws on literature from the fields of economics, psychology and public administration (Frey, 1997; Frey and Jegen, 2001; Jacobsen et al., 2014) to investigate whether GPs' personal characteristics and motivation profiles are important explanatory factors for understanding variation in GPs' implementation of RBK and its socio-economic impact.

Recent literature shows that intrinsically motivated health care professionals provide high-quality care even in the absence of external incentives (Leonard and Masatu, 2010, Barigozzi and Burani, 2016; LaGarde and Blaauw, 2017). For the less intrinsically motivated health care professionals other personal characteristics are likely to play a role for their care. As GPs act as agents for both their patients and the third-party payer, they face a double agency problem, aiming to satisfy two principals (Blomqvist, 1991). The degree to which the GPs align with third-party goals and signals depends on their degree of public service motivation (PSM) and user orientation (UO), i.e. to which degree they are motivated by fulfilling the overall objectives of the third-party payer versus doing good for the individual patient (Jensen and Andersen, 2015; Pedersen et al., 2016). Specifically, this WP investigates the moderator role of PSM and UO on changes in GPs' implementation of RBK for our four experiments (figure 1).

The GPs' motivational profiles will be elicited by means of a baseline and follow-up survey sent to all GPs in Denmark (in 2018 and 2020). The surveys will include the different components in the GPs' utility functions, i.e. patients' utility of treatment (UO), reimbursement (extrinsic motivation), the consideration for society/the third-party payer (PSM), and the GPs' inner joy with their work (intrinsic motivation). Each motivational component – and their subcomponents – will be measured using generic validated questions (Jacobsen et al. 2014). The answers to the survey enable us to estimate the extent to which the individual GP is motivated by each component. In the survey, we also include questions on other personal characteristics and questions relating to WP3, where we elicit GPs' perceived resource constraints, e.g. their feeling of time pressure and whether they are actively looking for more personnel etc.

***WP2** –**I**ncentives*

In Denmark, GPs are currently paid by a mixed scheme with a flat rate per capita (1/3) and a fee-for-service (2/3). This payment scheme is intended to incentivise GPs to provide easy access to primary care while they act as gatekeepers to more specialised care. The mixed scheme has been shown to favour GPs with less complex patients (Olsen, 2012). In this WP we study how monetary incentives impact on the implementation of RBK and the associated socio-economic impact.

The most direct way incentives can influence RBK is by linking payment to performance targets based on RBK. The large literature on this topic offers some evidence on the effectiveness of such schemes (Eijkenaar et al 2013; Emmert et al 2012). However, any type of remuneration scheme incentivises GPs to certain behaviours that may influence implementation of RBK. This WP will draw evidence from two changes in the 2018 collective agreement.

The first change is a replacement of fee-for-services provided to COPD and diabetes patients with a capitation payment. The capitation payment covers all GP services provided to these patients – including visits unrelated to diabetes and COPD. It is hypothesised that the shift to capitation will incentivise GPs to provide fewer services to diabetes and COPD patients (Krasnik et al 1990) and that this will have a negative effect on GPs' adherence to research-based treatments. The shift to capitation is initiated for each patient at the time of the first annual control visit after the implementation date – and implementation is rolled out step-wise across regions. This design allows for studying the causal effect of the shift to capitation. Several RBK services targeted diabetes and COPD patients can be monitored in the Danish registers (e.g. annual control visits, spirometry tests, microalbuminuria testing, and HbA1c measurements) and adherence to routine testing will be used as proxies for RBK. Societal impact will be measured by changes in patient outcomes indicated by e.g. hospitalizations and sick leave.

The second change in remuneration is the replacement of the flat capitation payment for all patients with a differentiated capitation payment involving higher rates for patients with higher expected need. As this change has a clear focus on inequality in care we will study if it reduces inequality in access to RBK treatment. Inequality will be measured using the health care gap (HCG) approach (Laudicella et al 2009) and by comparing changes in HCG across patients targeted by the change (high-need patients) as compared to patients not targeted (low-need patients). Comparison of targeted and non-targeted patient groups to draw causal inference has been applied with success previously (Harrison et al 2014).

***WP3** - **N**orms*

This WP investigates the effect of norms on GPs' implementation of RBK and its socio-economic impact on patients. Norms may be formed by interactions with peers (other GPs), the third-party payer (health authorities), and patients. We therefore analyse the effect of norms on GPs' behaviour in two subprojects: 1) NETWORK: enforced increase in peer contact in networks, and 2) NUDGE: a nudge to follow the third-party payer's/the individual patient's norms.

<u>NETWORK</u>

Networks or clusters are thought to enable face-to-face networking and the diffusion of knowledge (Porter, 1998). Through the use of a mixed method approach using qualitative analytical approaches (individual- and focus group interviews with GPs), and surveys, the introduction of enforced membership of a network will be evaluated both in terms of process and outcomes. A strategic sample of members will be selected for interviews from networks established in different regions of Denmark, including urban and rural areas with the aim of conducting a process evaluation of the compulsory membership of peer-network. The qualitative interviews will constitute a research project in its own right, but will also create the basis for a survey.

Based on survey data the individual networks will be categorised quantitatively in terms of whether they represent high-intensity or low-intensity networks (measured by the level of activities). Given that compulsory membership of networks is introduced nationwide, and there is no control group, we will use the heterogeneity in network practices to estimate a causal relationship between network intensity and increased implementation of RBK. We will focus on RBK related to different areas of appropriate GP prescribing behaviour in terms of indication, effectiveness, safety and appropriate duration. A special focus will be on poly-pharmacy and discontinuation of medication among the elderly. As GPs are free to choose their own network, this may introduce selection bias. We therefore intend to use the detailed survey information on GPs' personal characteristics (see WP1) to test and control for this selection. Also, we aim to analyse network effects for sub-groups of GPs (segmented on personal characteristics) to test the extent to which (some) personal characteristics constitute important moderator variables. In terms of socio-economic outcomes this sub-project will

focus on reduced cost of medication, reductions in hospital admissions relating to ambulatory care sensitive conditions and mortality.

NUDGE

General practitioners are agents to two principals: the third-party payer (who represents the interests of all insured citizens) and the individual patient. Thus, the norms of both these principals may influence GP behaviour. In Denmark, the third-party payer develops recommendations and legislation encouraging implementation of RBK. However, GPs may act against these norms for personal gains (such as profit and leisure), or because they operate in a very complex or resource constrained setting making it difficult to implement RBK in everyday practice.

This sub-project investigates the effect of a nudge (reminder) to GPs to make choices in everyday practice that are aligned with their principals' norms. We focus on norms related to the implementation of RBK for diabetes patients. We measure implementation of RBK using indicators linked to the Danish College of General Practitioners' (DSAM) clinical guidelines. According to these guidelines, patients' suffering from diabetes should receive a urinary albumin measurement annually (DSAM, 2012). This test detects microalbuminuria, which is a strong predictor of the development of diabetic nephropathy, other diabetic complications (cardiovascular disease), and early death (Mogensen 1984, Gall et al. 1995). Despite the importance of this test, a Danish study of quality improvement in general practice shows that only around half of diabetes patients receive the test (FEA, 2012).

DSAM's clinical guideline for treatment of diabetes patients is expected to be updated in 2018 (DSAM, 2017). We exploit this update – and set-up an RCT to test whether a nudge affects GPs' implementation of RBK. By random assignment some GPs receive a letter reminding them to follow DSAM's clinical guidelines, e.g. by providing the urinary albumin measurement, while the other GPs serve as a control group. The letter is framed in two different ways: either addressing the GPs' PSM (i.e. motivation to serve the third-party payer) or their UO (i.e. motivation to serve the individual patient). We estimate the effect of the nudge using the rich administrative registers documenting GPs' activities and laboratory results at the individual patient level combined with data on motivation type from our survey (see WP1).

WP4 - Resource **C**onstraints in **H**ealth care

In the absence of regulatory guidance, GPs who face considerable resource constraints may choose to lower their investment in RBK. However, little is known about the clinical strategies GPs employ when faced with these constraints. Although there is literature based on GPs' self-reporting (Zwolsman et al, 2012; Sadeghi-Bazargani et al, 2014), which suggests that a significant barrier to RBK implementation is lack of time, there is no empirical evidence demonstrating a causal relationship between time constraints and implementation of RBK. The hypothesis of this WP is that when GPs face resource constraints they will deter from more long-term investment and act in a more myopic manner, which decreases implementation of RBK and generates adverse socio-economic consequences.

For the purpose of analysing the effect of changes in resource constraints we combine several sources of data: 1) longitudinal survey data which includes information on GPs' self-perceived workload, 2) data on GP characteristics, and 3) rich administrative data including information on prescribing behaviour, laboratory tests etc. We make use of data from both the UK and Denmark. From the UK we have access to three waves from a longitudinal survey of 2,000 English GPs from 2012, 2015 and 2017. From Denmark, we have two waves from 2018 and 2020 (see WP1 for further description).

We estimate whether a change in resources for the individual GP changes RBK implementation. Implementation of RBK is measured by GP prescription behaviour (sedatives, antibiotics, discontinuation of medication), and monitoring of diabetes (HbA1C, microalbuminuria). Further, we will register associated socio-economic consequences such as cost of medication and job market participation. To ascertain causality, we exploit exogenous shocks to the GP's workload, such as the WORKLOAD experiment, which dictates that diabetes and COPD patients should be moved out of ambulatories and into general practices. This will be done step-wise, and will thus generate heterogeneous variation in additional demand for diabetes and COPD related services across GPs. Further, we will investigate whether GPs' self-perceived workload is a potential moderator when measuring the effect of the experiments CAPITATION, NETWORK and NUDGE.

Data management

Data will be stored on a secure server in concordance with current data protection acts.

Ethical approval

The study will be reported to the local Ethics Committee of Southern Denmark and the Danish Data Protection Agency.

Co-applicants

Dorte Ejg Jarbøl (general practitioner) is associate professor and senior researcher at the Research Unit for General Practice, and works part-time in her own practice. She has expertise with design of clinical trials in general practice, interview studies, surveys and register-based trials.

Kim Rose Olsen (economist) is an associate professor at DaCHE and has conducted research on general practice remuneration schemes, incentives, data driven quality development and other organizational issues for more than 10 years. He is an experienced project manager with long time experience of interdisciplinary- as well as policy oriented research.

Anne Sophie Oxholm (economist) is employed as a postdoctoral researcher at DaCHE, but has many years of prior research experience. Her primary research interest is the design and effects of incentives schemes targeted GPs. She has extensive experience with conducting registry-based analysis and designing large-scaled RCTs.

Line Bjørnskov Pedersen (economist) is associate professor at DaCHE and senior researcher at the Research Unit for General Practice. She has expertise in the agency relationship in general practice and motivation crowding. She also has great experience with the design of surveys targeting GPs.

Collaborators

The following highly skilled researchers have agreed to be involved in specific sub-projects: Thomas Allen (Uni of Manchester), Mario Pezzino (Uni of Manchester), Søren Rud Kristensen (Imperial College London), Mauro Laudicella (Imperial College London), Christian Bøtcher

Jacobsen (Aarhus Uni); Ulrich Thy Jensen (Uni of Arizona).

These individuals have been carefully selected to ensure that the PINCH project group encompasses a broad set of skills.

Figure 1

The PINCH project

- Regulating and nudging for better implementation of research-based knowledge in health care