

Measuring Integrated Care

An International Comparative Study

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THE 5 ORIGINAL PAPERS ARE

- I. Strandberg-Larsen M & Krasnik A. Measuring integrated health care delivery – a systematic review of methods and future research directions. *International Journal of Integrated Care* 2009;9:e01.
- II. Strandberg-Larsen M, & Krasnik A. Does a public single payer system deliver integrated care – a national survey study among professional stakeholders in Denmark? *International Journal of Integrated Care* 2008 Jul 14;8:e61.
- III. Strandberg-Larsen M, Nielsen MB, Krasnik A. Are joint health plans effective for coordination of health services? – An analysis based on theory and pre-reform results. *International Journal of Integrated Care* 2007 Oct 3;7:e35.
- IV. Frølich A, Schiøtz ML, Strandberg-Larsen M, Hsu J, Krasnik A, Diderichsen F, Bellows J, Sjøgaard J, White K. A retrospective analysis of health care health systems in Denmark and Kaiser Permanente. *BMC Health Services Research* 2008 Dec 11;8:252 (Highly Accessed)
- V. Strandberg-Larsen M, Schiøtz ML, Silver JD, Frølich A, Andersen JS, Graetz I, Reed M, Bellows J, Krasnik A, Rundall T, Hsu J. Is the Kaiser Permanente model superior in terms of clinical integration?: A comparative study of Kaiser Permanente, Northern California and the Danish healthcare system. *BMC Health Services Research* 2010 Apr. 8;10:91. (Highly Accessed)

A new drug cannot be introduced . . . without exhaustive scientific trials, but we usually introduce new ways of delivering health services with little or no scientific evaluation. We rationalise, change and formulate new systems, often based upon economic and political imperatives, and yet rarely evaluate their impact upon patients. Significant morbidity and mortality may be associated with new models of healthcare delivery. If healthcare system changes were submitted to the same scrutiny as new drug evaluations, they would probably not even be allowed to move from the animal to the human experimentation stage. Hillman K.M. (1)

Chapter I Introduction

In this chapter the medico-technological and epidemiological background for the challenges of modern healthcare systems is outlined. Since an integrated delivery of healthcare services is believed to be the panacea to solve these challenges, I argue what evidence is needed to bring the field forward – justifying the focus of the research in this thesis. Subsequently, the Danish healthcare system is presented as the main case in this thesis followed by a short presentation of an alternative healthcare system model; namely, the US managed care organization Kaiser Permanente. This sets the stage for the comparative part of the thesis. The research aims and scope of the thesis are then elaborated, and it is described how the work presented in this thesis is linked to two separate research networks. Finally an overview of the thesis is given.

1.1 The changing challenges for healthcare systems

Despite significant variation in healthcare system design across and within countries, there are several factors that have become critical to all developed nations, besides facing macroeconomic restraints and troublesome variations in quality (2-4). Two overarching themes creating a need for provision of a coordinated continuum of healthcare services are presented in the following sections.

1.1.1 Medico-technological advances and increased specialization

A rapid and extensive advance in our medico-technological knowledge has meant a significant growth and need for specialization in modern medicine. We have come a long way since the middle ages where there were only three well established guilds of healthcare practitioners, the physician, the surgeon and the apothecary (5), and where nursing was not even an organized activity (5). Today, specialization of healthcare professionals, and thereby the division of labour into various tasks, is an imperative for our whole mindset on how healthcare should be delivered to benefit patients (5). It has been estimated that a typical patient sees a median of two primary care physicians and five specialists each year, in addition to accessing diagnostics, pharmacy, and other services. Patients with several chronic conditions may visit

up to 16 physicians in a given year (6;7). These care patterns with multiple providers involved create a need for coordination of delivered services for the individual patient to benefit fully from the specialization process and to experience an integrated delivery of services, where specialization of health professionals is an asset without being a potential barrier to provision of high quality care (6).

1.1.2 Change in disease patterns and aging populations

The epidemiological transition and socio-demographic forces, with the latter changing the age distribution in the populations, have meant a significant increase in the number of patients living with a chronic disease or multiple chronic diseases (2;8;9). Patients with chronic conditions have been depicted as a major challenge to healthcare systems since their conditions demand a paradigm shift from episodic, short-term interventions – which characterize care for acute conditions – to long-term, comprehensive care for those with continuing care needs (3). Thus, policymakers and health-system planners are striving to transform existing healthcare systems (10) developed in response to meeting acute care needs but now criticized for incoherent healthcare delivery, wasted resources and poor performance results and possible suboptimal clinical outcomes (3).

1.2 Integrated healthcare delivery: the new panacea?

As providers of healthcare services face the multiple challenges of today's healthcare environment, many believe that more integrated healthcare services will enable the system to provide higher quality care at lower cost while maintaining or improving the health and satisfaction of their patients (3;10-15). In its influential work on Crossing the Quality Chasm, the US Institute of Medicine identified six essential aims for any healthcare system (16). Developing the ability to coordinate care across patient conditions, services and settings over time was one of these six redesign imperatives that policy makers and health-system planners should strive to build into their delivery system to overcome the challenges of modern medicine and to improve the public health needs of the population that they serve (16;17). Likewise, the World Health Organization and the European Commission have also both promoted the importance of integrated care (18;19). The main arguments generally presented for why an integrated care approach should improve system efficiency have been summed by Lloyd et al. 2007 (18):

- Appropriately targeting care and resources
- Preventing duplication of treatment or assessment by different professionals
- Preventing costly bottlenecks and gaps in care pathways
- Ensuring care decisions are taken with due regard to upstream capacity and resources
- Ensuring care is undertaken by the right professionals.

Possibly the most important argument for an integrated approach is the potential to provide a more seamless care experience for the recipient of the services delivered in order to improve the continuity, quality and outcomes of care for patients (18).

1.2.1 Studies investigating possible benefits of integrated care approaches

Although it is not an objective of this thesis to investigate the benefits of an integrated approach, a short resume of available evidence in this field is presented because it delineates what kind of research is needed to bring the field forward. Despite wide-

spread use of the term 'integration' there are no shared definitions in the healthcare literature (3). Thus, the purpose of Chapter II is to contribute to the understanding of the concept of integrated care. For now it is relevant to distinguish between two distinct conceptual subcategories which can be identified within the literature referring to integrated healthcare, being either a) an organizational structure that primarily follows economic imperatives (e.g. that unites a financing group with all providers – from hospital, clinics, and physicians through home care and long-term care facilities to pharmacies) or to b) a way of organizing care delivery – by coordination of different activities to ensure harmonious functioning – ultimately to benefit the patients in terms of clinical outcome (13;20). While these two subcategories are possibly interrelated, through a classical Donobedian model of structure-process-outcome (21), the first subcategory is distinguished by studies highlighting possible healthcare system redesign strategies. The second subcategory is distinguished by strategies that promote incremental or "add-on changes" within the boundaries of an existing healthcare system. In this section I focus on the latter which are often referred to as care coordination interventions in the literature (14). It is an apparent paradox that while there is a vast amount of literature with specific studies evaluating care coordination interventions, the cumulative evidence of the benefits of such interventions is limited. However, in recent years several large scale attempts have been made to address this research question using the existing literature (11;14;22;23). In 2005 a review of 13 systematic reviews concluded that integrated care programmes seemed to have positive effects, for example, on functional status and health outcomes, patient satisfaction, and quality of life (22). Cost effectiveness of the programmes could not be demonstrated due to lack of studies. Furthermore the authors stressed that caution must be exercised due to widely varying definitions and components in the individual programmes and studies evaluating their effects. Such findings were to a large extent a confirmation of that already described by Chen et al. in Mathematica Policy Research report published in 2000 (11). The findings of Chen et al. suggested that care coordination did hold the potential to reduce healthcare utilization while maintaining or improving the quality of care for chronic illness, it was unclear whether potential savings would exceed the cost of the intervention (11). Chen et al. demonstrated the complexity of the issue and stressed that more evidence was needed to be able to demonstrate consistency of results within diverse clinical settings and across healthcare systems. The research within the field seems to be accelerating and during 2007 both an extensive literature review prepared by Stanford University and a systematic Cochrane review were conducted on coordinated care programmes (14;23). The key findings of the extensive technical review identifying 20 different coordination interventions (e.g. multidisciplinary teams, case management, and disease management), covering 12 clinical populations (e.g. mental health, heart disease, and diabetes) and conducted in multiple settings (e.g. outpatient clinics, in the community, and at home) were that evidence of some benefit of care coordination interventions within particular clinical areas was demonstrated. However, once again it was stated that what was needed to bring the field forward was more conceptual, empirical and experimental research (14) before firm conclusions could be drawn. This was in line with the findings of the systematic Cochrane review where it was concluded that before thorough intervention studies (randomized controlled trials) can be designed and field tested, conceptual clarity and insight into the type of coordination issues that are relevant are needed (23).

1.3 The Danish healthcare system as a case

The Danish healthcare system is the main case in this thesis, and important system characteristics are thus presented in the following.

1.3.1 Organization and financing of the Danish healthcare system

As a Beveridge-type healthcare system the Danish healthcare system belongs to the same family as the healthcare system found in the United Kingdom (England, Scotland, Northern Ireland, and Wales) and in the Nordic countries Sweden, Norway and Finland (4;24;25). In Denmark, laws and formal regulation imposed at the state level have traditionally been sought to be minimised due to the decentralised structure of the healthcare system mainly funded through taxation (26). The planning system reflects the decentralised nature of the Danish healthcare system, with the regions and municipalities as planners and providers of healthcare services and the state being responsible for providing the overall framework to accomplish this task (26;27). The healthcare system covers all inhabitants and most services are produced by public providers at the regional or local level (26). An important exception to this is the general practitioners and practising specialists, who are self-employed and work in private clinics. The general practitioners are reimbursed for their services by the regional authorities through a combination of capitation and fee-for-service, and the practising specialists solely through fee-for-service. The Danish healthcare system involves a gatekeeper function where the general practitioners are expected to guide patients through the system as it relates to access to specialised care and to ensure follow up after hospitalisation (26). Thus, in a Danish setting it is crucial for a positive and coherent patient process that cooperation between the hospitals run at the regional level, the general practitioners, practising specialist and the municipal health services is efficient and stable (26).

1.3.2 Integrated care in a Danish health policy context

The delivery of coordinated health services is an explicit aim in the first paragraph of the Danish Health Act (28) and has been a recurrent issue in Danish policy documents and commission reports. At the state level the issue entered the political agenda in the 1970s, where coordination of care at a system level was debated (29). The debate was continued throughout the 1980s with a ministerial white paper on coordination 'Samordningsbetænkningen', published in 1985. The paper concluded that the main barriers to coordination were the political-administrative dispersion of responsibility and distributed financing structure, that the many different unions of healthcare professionals was an inhibiting factor for making collective agreements to benefit coordination, that there was cultural resistance to change among the politicians, health professionals and administrators, and finally that there was a lack of incentives promoting coordination among involved stakeholders (29;30). In 1986 a ministerial descriptive report on local initiatives towards coordination and readjustments in healthcare was published (31), and in 1988 a report by the Toftegaard committee concluded that myths and lack of management initiatives were the main obstacles for cross-sectorial cooperation in Denmark (29). In 2003 a workshop was held by the Clinical Unit for Disease Prevention on the challenge of chronic diseases highlighting lack of coordination in the Danish healthcare system (32). In 2004, the advisory committee to the Minister of Health stressed that coordination of care was a key challenge to obtaining quality improvements and an optimal use

of scarce resources (33). In 2005, the National Board of Health published a report with recommendations on how to improve care for patients with chronic diseases, based on the principles of the chronic care model, which emphasize an integrated delivery of healthcare services (34;35).

It is a characteristic of the existing commission report and policy documents published over three decades that coordination of care is depicted as a highly prioritised policy goal. However, it is also evident that many of the issues reported by the ministerial commission in 1985 have, to date, not been met with adequate solutions. Some of the issues mentioned in the 1985 commission are repeated in the ministerial commission report of 2004. This does not necessarily reflect a lack of willingness to deal with the problems. On the contrary, a recent European Union Survey (PROCARE) of integrated care approaches across member states depicts Denmark and the United Kingdom as the most developed EU countries regarding implementation and testing of coordination of care strategies (3). That coordination of care is a recurrent issue should therefore rather be seen as a result of the vast complexity of the issue and that healthcare systems are a dynamic field where new challenges constantly arise. As already described, some of these challenges are a result of societal developments, and others are a result of reform initiatives due to competing interests and objectives. In Denmark, an example of the latter is the introduction of free choice reforms that allowed patients to use services outside the traditional catchments areas; thus creating a need for coordination of care among the decentralized authorities responsible for provision of healthcare services (36). That the extended free choice under certain circumstances includes the possibility of treatment in the private sector and abroad only increases the complexity. The newly introduced health centres, which among other things are intended to support patients with chronic illness, have interestingly also created new potential gaps in the healthcare system (26;34).

1.3.3 An overview of care coordination strategies applied in Denmark

Several initiatives to improve coordination of care on both an administrative and functional level have been introduced in Denmark. Table 1 presents an overview of identified methods for coordination of care applied in the Danish Healthcare System related to disease management, care/case management and care transition management as defined by the OECD (37). If identified, evaluation results in relation to the applied methods are also presented. The methods for coordination of care have been exploratory and are mostly local initiatives that are not necessarily replicated at the national level. Innovation as such remains a core characteristic of coordinated care in Denmark. This could most likely be explained by the decentralized nature of the healthcare provision, which gives rise to numerous natural experiments. Other initiatives on care coordination have been macro level planning e.g. administrative health plans, which, however, in a qualitative study have been shown to have limited impact on the functional levels of care (38).

1.3.4 Studies on integrated care in Denmark

Despite the fact that coordination of care having been on the political agenda for more than three decades, there have been surprisingly few scientific investigations on this subject in Denmark.

The studies, reports and working papers identified can generally be classified in five categories:

Table 1. Methods for coordination of care and evaluation results in Denmark		
	Description of method	Results of evaluations
Disease management	<ul style="list-style-type: none"> Chronic disease self-management programmes based on the Stanford model have been piloted and have been recommended for nationwide implementation. There is focus on patients with: diabetes type II, COPD, and other major chronic diseases (35). Disease-specific clinical guidelines have been developed or are being developed for most major diseases. Non-adherence by doctors does however not incur formal penalties (35). Private entrepreneurs are beginning to offer health programmes educating patients with a chronic condition in disease-specific self-management (64). 	<ul style="list-style-type: none"> An evaluation concluded that the diabetes patients are satisfied with the piloted self-managements programmes, but more than half the patients would like a more structured follow-up on the programme. Observations of changes in effect measures e.g. HbA1c, cholesterol or blood pressure were not a part of the evaluation (65).
Care/Case management	<ul style="list-style-type: none"> Care/Case management initiatives have been recommended by the National Board of Health (35). Private entrepreneurs have developed patient guidance arrangements to make the care process as efficient as possible (64). 	<ul style="list-style-type: none"> No formal evaluations have been identified.
Care transition management	<ul style="list-style-type: none"> Gatekeeping system (GPs expected to guide patients through the system as it relates to access to secondary care and to ensure follow-up after hospitalization) (66). Nationwide general practitioner consultant arrangement [coordinating the primary/secondary care inter-phase] (67). Some hospitals have deployed multidisciplinary Geriatric teams to achieve coherent treatment and follow-up, and give patients the opportunity to be treated in their own homes (18). Obligatory written health agreements to coordinate the efforts of the regional and municipal level regarding hospital discharge procedures, social service provision for people with mental disorders, and preventive and rehabilitation services (68;69). 	<ul style="list-style-type: none"> The practice consultant arrangement has been evaluated and the results show that the arrangements contributed positively to improved communication and breaching of barriers hindering communication (67). In some municipalities, the use of geriatric teams has led to increased take up of home-care, day centre and other services, as the teams have identified patient needs that have previously escaped notice (18). The health agreements are an extension of the previously used health plans, which have been used for more than a decade. The health plans have not ambiguously fulfilled their aim seen from the perspective of the regional and local authorities (38).

- Evaluations of disease specific shared care programmes (39-46)
- Evaluations on whether patient pathways, according to specific patient records, fulfil explicit quality measures (47;48)
- Studies on IT supported shared care (49-54)
- Studies that applied a systemic/organizational perspective to identify coordination of care challenges in the healthcare system (29;38;55-63)

Studies on integrated healthcare services in Denmark have primarily been case studies identifying problems of information exchange between sectors and describing disease specific gaps in the healthcare system. The gaps are typically described as related to structural and cultural barriers. Few, if any, studies have investigated the scope of the issue. A consensus conference held by the Association of County Councils in 2004 also concluded that there is a need for evidence on the scope of the challenge, derived through quantitative studies (70;71).

1.4 Kaiser Permanente as an alternative healthcare system model

The US managed care organization Kaiser Permanente (KP) is a healthcare system in vogue (72;73). Within recent years KP has started to influence the mindsets and policy development within

many European healthcare systems. Delegations from a broad range of countries have visited the organization (74). The reason for this interest is that KP has been highlighted as a successful model of integrated, cost effective care (75-77). In their influential article Feachem et al. compared the costs and performance of the British NHS with those of KP in California (KPC). They concluded that KPC provided much better value, largely by using only a third of the acute bed days used in the NHS. This was explained by integration throughout the system, efficient management of hospital use, the benefits of competition, and greater investment in information technology (78). Taken at face value the benefits of the KPC model are substantial. However, the claim was subsequently disputed and several serious criticisms were levelled at the methods used (79;80). To investigate further Ham et al. carried out a more detailed study of the KPC model (76). The findings were again in the favour of KPC with much lower hospital admission rates and overall length of stay than in the NHS. Ham et al. pointed to several factors potentially explaining the findings, including integration of funding with provision of care and integration of inpatient care with outpatient care and prevention (76). Several commentators further pointed to the importance of highly coordinated primary care services and the use of clinical protocols as a driver of KPC's performance (77;81-83). Nevertheless, the evidence base is far from conclusive (72;73). What is evident is that KPC by mere definition is an integrated delivery system, defined as an organizational structure that primarily follows economic imperatives (e.g. that unites a financing group

with all providers – from hospital, clinics, and physicians through home care and long-term care facilities to pharmacies)(13;20). It has, however, never been shown how this translates into delivery of integrated services at the clinical level where it is thought to mean most for the quality of care to benefit the recipients (84). The characteristics of the Kaiser Permanente healthcare system model are presented briefly in the following sections, with a focus on primary care delivery in the Northern California region.

1.4.1 Organization and financing

Kaiser Permanente (KP) is an integrated managed care organization founded in 1945 by the industrialist Henry J. Kaiser and the physician Sidney R. Garfield. KP operates in the US where healthcare is provided by a mix of private insurance companies and the Governance through Medicaid¹ and Medicare². Thus KP operates in a competitive market. KP is a part of the US healthcare system, even though the US healthcare system is not a system in the European sense of a system (85;86). KP operates in eight regions and is the largest not-for-profit managed care organization in the United States, with 8.2 million members (87). Within the literature there has been particular focus on KP in California (KPC), and the Northern California region (KPNC), is the largest of the regional entities(73). KPC is a consortium of three separate but interdependent groups of entities: the Kaiser Foundation Health Plan and its regional operating organizations, Kaiser Foundation Hospitals and the Permanente Medical Groups. Kaiser Foundation Health Plan and Hospitals are integrated with independent physician group practices called Permanente Medical Groups. The health plan is the insurance part of the organization, while the hospitals and medical group provide the clinical services (88). To the public these hospitals and general practitioner-type facilities are seen as one organization, which is commonly referred to as Kaiser. The financial structure of KPC sets the framework for an integrated delivery of care. The health plan and hospitals operate under state and federal not-for-profit tax status, while the medical groups operate as for-profit partnerships or professional corporations in their respective regions (89). The financing sources of KPC come from members' dues, Medicare, co-payment, deductibles and fees. In 2004 the revenues was distributed as follows: members' dues 71 %; Medicare 22.3 %; and co-payment, deductibles, fees and other revenues 6.7% (90). These are paid to the Kaiser Foundation Health Plan who contracts with the for-profit Permanente Medical Groups and the Kaiser Foundation Hospital who runs medical centres in California, Oregon and Hawaii and outpatient facilities throughout the regional entities.

1.4.2 Kaiser Permanente as a setting for integrated patient pathways

Within Kaiser Permanente, Northern California (KPNC) a range of health services are provided, including hospital admission, ambulatory and preventive care, accident and emergency, optometry, sub-acute care, rehabilitation, and home healthcare. The coverage of KPNC depends on the selected health plan, ranging from low coverage health plans with relatively high co-payment to health plans with extensive coverage and minimal co-payments (78;91). A typical patient in need of primary care will, in KPNC, be treated and cared for solely in an out-patient medical centre. The

medical centres have a range of primary care staff and facilities available, including paediatricians, internal medicine physicians, geriatricians, specialists, nurse practitioners, nurses, health educators, administrative personnel, a pharmacy, and an emergency department. Additionally, the physicians have access to in-house laboratory facilities, and other advanced medical equipment. When necessary, patients are admitted to a hospital, and subsequent care and some rehabilitation will be administered outside the hospital at a skilled nursing facility (SNIF) (73). KPNC contracts with SNIFs that function as independent facilities. Integrated patient pathways are facilitated by a team-based approach, the multi-specialty medical centres and use of clinical guidelines, case and care managers, disease management programmes and patient self-management programs. Information exchange across providers is made possible by the operational electronic health record "KP HealthConnect", also allowing for multiple patient panel management and two way patient contact (87). With the above features Kaiser Permanente has been put forward as an example for European healthcare systems to follow (73). However, in recognition of high level policy making to be based on evidence instead of convincing rhetoric and supposition, more detailed studies must be initiated to enlighten us as to whether the approach is efficient compared to existing European practices, and in this thesis the Danish case.

1.5 Research aims

As shown above, the positive outcomes of integration are to an increasing extent becoming clear. However, a recent Cochrane review showed that the complexity of the field is an inhibiting factor for vigorously designed trial studies (23). This is in line with the existing literature (11;14;22). Conceptual clarity and a consistent theoretical framework are thus needed for the research field to move forward. Policymakers, health system planners and managers striving to build and manage healthcare systems that can accommodate delivery of coordinated services need evidence based policy options and information on the scope of the integrated care challenges they are facing. To promote change, information obtained on a healthcare system, such as that in Denmark, must be compared with the achievements in other healthcare systems. Such comparative analyses should be conducted with awareness of the context in which a given healthcare system operates, and awareness of the potential differences in inputs and benefits offered.

Thus, this thesis has five aims:

- 1) To contribute to the understanding of the concept of integrated care and to identify measurement methods to capture the multi-dimensional aspects of integrated healthcare delivery. (Chapter II and Paper I)
- 2) To assess the level of integration of the Danish healthcare system at the baseline for implementation of the structural reform in Denmark (Paper II)
- 3) To assess the use of joint health plans as a tool for coordination between the regional and local level in the Danish healthcare system at the baseline for implementation of a structural reform (Paper III)
- 4) To compare the inputs and performance of the Danish healthcare system and the managed care organization Kaiser Permanente, California, US (Paper IV)
- 5) To compare primary care clinicians' perception of clinical integration in two healthcare systems: Kaiser Permanente, Northern California and the Danish healthcare system. Further, to examine the associations between specific organizational factors and clinical integration within each system (Paper V)

¹ Medicaid is the United States' health programme for individuals and families with low incomes and resources.

² Medicare is a health insurance program administered by the United States government, covering people who are either age 65 years and over, or who meet other special criteria

1.6 Links to other research projects

The work presented in this PhD thesis is closely connected to two research networks: 1) a Danish multi-institutional research network formed to evaluate the impact of the structural reform on the function of the Danish healthcare system and 2) an international research group formed to compare the organization and performance of the Danish healthcare system with the managed care organization Kaiser Permanente, California, US.

1.7 Structure of the thesis

This thesis contains six chapters and has resulted in five original papers. The first chapter is an introduction with the purpose of the thesis. In chapter II a conceptual framework on integrated care is presented. In chapter III the material and methods are described. In chapter IV an overview of the results from each paper is presented, and chapter V is a discussion of the principal findings and research methods applied. In chapter VI policy implications and topics for future research are proposed.

CHAPTER II CONCEPTUAL FRAMEWORK

Every organized human activity – from the making of pots to the placing of a man on the moon – gives rise to two fundamental and opposing requirements: the division of labor into various tasks to be performed, and the coordination of these tasks to accomplish the activity. Mintzberg H. (92)

In this chapter I develop on the concept of integrated care. The conceptual diversity used within the field of integrated care is vast (93). 'Integrated healthcare delivery' is one more term in a line of related terms used in different contexts and countries, for example, shared care, transmural care, integrated care, continuity of care, seamless care, and integrated care pathways, all of which have broadly overlapping meanings (13;94). The major shortcoming of the literature is that the concepts used are frequently neither defined nor conceptualized (13). An extensive systematic review on care coordination published in 2007 found 40 different definitions of care coordination and described them as being extremely heterogeneous (14). Theoretical and conceptual clarification is therefore appropriate. Here, emphasis is put on presenting concepts that are widely used within the field, for example, integration, coordination, cooperation, continuity and related sub-concepts. I propose a contribution to the field by ordering the concepts and describing how they inter-relate. A conceptual model for assessment of the conditions for integration as an intermediate healthcare system outcome is likewise presented. The model is based on theoretical frameworks provided by Shortell et al, and Alter and Hage (15;95). Aspects from the model were used to analyse data and the results are presented in Paper II, III and V. Finally, I propose a new definition of integrated healthcare delivery combining the conceptual frameworks of major theoretical writers within the field.

2.1 Developing on the concept of integrated care

'Integrate' comes from the Latin word integer, meaning whole, undivided and complete (96). In 1967, within organizational theory Lawrence and Lorsch introduced the concept of differentiation and integration (97). They viewed differentiation processes as necessary for organizations to be able to adapt to the demands of their surroundings; thus making integration a necessary response if the entire organization should operate as a single entity (97). Lawrence and Lorsch defined integration as "the quality of

the state of collaboration that exists among departments that are required to achieve unity of efforts by the demands of the environment" (97). Within the distinct field of health services research and health policy, integration is often used as the overarching term for a long list of similar terms. MacAdam described integration as a nested concept with multiple meanings and finds that the term can refer to types, levels and form (3). Leutz distinguish between the following types of integration: linkage, coordination and full integration (98). Ahgren et al. added a zero-point to this continuum of integration by adding full segregation as a type of integration and further by viewing cooperation as being in between coordination and full integration (99). Others have put emphasis on the different levels of integrative activity that can concern system-level activities, organizational-level activities or clinical-level activities (3). Finally, the terms vertical and horizontal integration are often used within the literature to describe different forms of integration. Vertical integration is often used to refer to the delivery of care across service areas within a single organization, and horizontal integration often refers to coordination of care across settings (3). A less often used, but an increasingly important concept, is virtual integration (100;101). Virtual integration is similar to vertical integration in the sense that it attempts to link the components of a system in order to operate as a single entity. The means by which this objective is reached, however, are different. Virtual integration emphasizes coordination through patient management agreements, provider incentives and information systems, rather than through investment in large numbers of facilities and people. Virtual integration also allows for the linked organizations to continue operating as separate entities (100;101).

While it is most useful to view integration as a nested concept referring to types, levels, and forms, it does not encompass all the perspectives seen in the literature on integrated care. These perspectives are described in the next section.

2.1.1 Approaching the field from different perspectives

To gain conceptual clarity and to order the concepts widely used within the field, I build on the work by Kümpers (94). Kümpers has showed how the field on integrated healthcare delivery and like concepts can be seen as approaching the field from different perspectives, although these are inter-related and partly overlapping (94).

The perspectives are:

- Patient perspective: focus is on the patient's experience with a single provider or the journey of the patients through a system of providers.
- Organizational and management perspective: focus is on strategic development and on intra- and inter-organizational coordination, and comprises arrangements such as case management and multidisciplinary teams.
- Logistic perspective: focus is on the recommended routes of patients through the system and the links between its component parts.
- Policy perspective: as a policy concept integrated healthcare delivery refers to optimizing the healthcare system as a "combined whole" through respective legislation, regulation systems and policy programmes.
- Economic perspective: from a microeconomic perspective focus is on efficiency in terms of gaps and overlaps in service delivery (94), and from a macroeconomic perspective the economic imperative focuses on the poten-

tial benefits of healthcare alliances created through mergers and acquisitions (13).

I propose including an additional perspective as suggested by Shortell et al. (15).

- Clinical practice perspective: focus is on coordinating patient care services across people, functions, activities, and sites over time so as to maximize the value of services delivered to patients seen from a clinical viewpoint. Shortell et al. refer to this as clinical integration.

To complete the list I also propose adding a perspective often neglected in the literature but which Axelsson et al. have shown will gain importance in the future of healthcare services challenged by the rise in chronic conditions (97):

- Public health perspective: focus is on providing the population and/or high risk groups within the population with services needed for optimization of population health. This perspective will often go beyond the realm of healthcare, and coordination of services will therefore also be expanded to include social care services or similar.

These perspectives add some dimensions of integration that are not included in the above description of types, levels, and forms. Any researcher, decision maker, healthcare planner, healthcare professional or patient who addresses the issue of integrated healthcare delivery should make their perspective explicit. This will decrease conceptual misunderstandings and make it clear what dimension of integrated healthcare delivery that are being addressed. This is essential since integration means different things to different stakeholders and since the warranted solutions to the perceived challenge e.g. which monitoring tools to apply, which interventions or management strategies to implement are highly dependent on the perspective. The term functional integration, which is often used especially in the US based literature can be seen as addressing integrated healthcare delivery from an organizational and management perspective combined with a macroeconomic perspective since it arises when the system of care links its financing, information, and management modalities, so as to add the greatest overall value to the system (93;102). Kumpers has argued that the patient's perspective (and grounded in the same humanitarian rationale also the public health perspective) and the economic perspective are substantial, while the other perspectives can be seen as instrumental to their achievement (94). I will argue that although the patient's experience of care is important, the greatest potential gain for the patients in terms of an improved clinical outcome depends on whether delivery of services is based on clinical best practices. Therefore, Shortell et al. have argued that what is often referred to as clinical integration is the most important type of integration in that it focuses on the attempts of healthcare professionals to coordinate their individual clinical practices around a particular patient (15).

2.1.2 Defining and ordering central concepts

We can now define and – with the above perspectives in mind – order the concepts continuity, cooperation, coordination and integration and related sub-concepts.

Continuity

The concept of continuity of care is frequently used within the field and is often understood to imply a patient's perspective

(93;103;104). From a patient's perspective, emphasis is on the patient's experience with a single provider or the journey of the patients through a system of providers. Bodenheimer argues that care coordination is not necessary when continuity is almost total (6). Thus Bodenheimer describes continuity and fragmentation of care as opposite ends of a spectrum (6). Continuity of care has been described as having two essential characteristics: a longitudinal extension in time and a centralized focus on individual patients (93). Three types of continuity have been distinguished in the literature: informational continuity, relational continuity (provider continuity) and continuity in approach (93;104). Continuity of care is somewhat different from the other concepts used within the field because continuity does not refer to an attribute of healthcare systems but rather to the subjective perceptions of the patients experiencing coordinated services or integrated care.

Cooperation, Coordination and Integration

The concepts of cooperation, coordination and integration are clearly interrelated and are often used interchangeably. However, to reach conceptual clarity, cooperation can be defined broadly as an interaction between two or more persons (clinical practice perspective) or organizations (organizational and management perspective), whereby resources are exchanged. Cooperation can involve deliberate adjustment and collective goals but is often not necessary for the exchange to take place (95). Coordination is used to describe the process whereby the cooperation between two or more persons or organizations is subjugated deliberate adjustments and collective goals. Integration is thus used to describe a coordinated form of cooperation, where own and others' activities are clear and where a mutual knowledge of working methods and working conditions is established. Integration is thereby the endpoint of the coordination process. Opposed to previous work, this conceptualization emphasizes the difference between coordination as an activity and integration as a performance outcome.

2.1.3 A conceptual model for integration

To develop a conceptual model for assessment of the conditions for integration, as an intermediate healthcare system outcome, I adjusted and extended the theoretical framework provided by Shortell et al. and Alter and Hage (84;95). The framework developed by Shortell et al. was originally intended to analyse hospital-based organized delivery systems. The framework by Alter and Hage was not developed specifically for healthcare system analytical purposes. I developed the model to be consistent with that of interorganizational network theory/soft system theory, since the healthcare system is seen as a complex "whole" that comprises organizations or sub-systems with specialized levels becoming progressively more complex (105;106).

In the conceptual model integration is conceived to be an intermediate outcome in a healthcare system and is conditioned by external and internal factors and processes (Figure 1). The external conditions comprise the health policy environment, the level of knowledge in a given society, and the resource pressure, which reflects both demand for healthcare services and resources available for delivering such care. The internal conditions comprise the four factors which according to Shortell et al. are important to have in place to achieve organization-wide impact on integration: namely, the overall organizational structure of a healthcare system; the technology available, including skills and training, and also health information technology; a management strategy that gives emphasis to achieving integration; and culture, which refers to the underlying beliefs, values, norms and behaviours of the

system which either supports or inhibits coordination activities (84). These four internal factors facilitate or inhibit what Alter and Hage call operational processes, whereby the cooperation between two or more persons or organizations is subjugated deliberate adjustments and collective goals. Alter and Hage identify a minimum of two hierarchical levels that must be coordinated: administrative and operational levels. Administrative coordination describes inter-agency activities at the senior management and administrator level. Operational coordination (task coordination) describes inter-agency activities at the front-line staff or case-manager level (95). Integration is thus a result of the coordination processes at these two levels and the level of conflict in a network. Whether integrated care is built from a top-down or a bottom-up approach is discussed in the literature (107). In the conceptual model presented in Figure 1 the approaches are conceived to be equally important and mutually interdependent. Delivery of services that improve the health of individual patients and the health of the population is seen as the ultimate outcome for any given healthcare system.

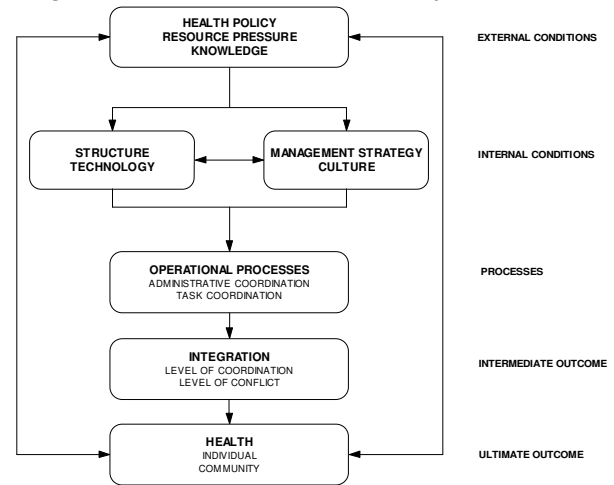
2.1.4 Proposing a new definition of integrated healthcare delivery

Various specific definitions related to integration within the context of healthcare systems are available (10;13;93;108). In this literature integrated healthcare delivery has been defined in functional terms as a series of operations concerned in essence with the bringing together of otherwise independent administrative structures, functions and mental attitudes in such a way as to combine these into a whole. The concept has also been defined in organizational terms as those services necessary for the health protection of a given area and provided under a single administrative unit or under several agencies with proper provision for their coordination (109). Non of the identified definitions include all of the aforementioned perspectives in addition most of them do not sufficiently emphasize the envisaged outcomes beyond economic imperatives (13). We therefore propose a new definition of integrated healthcare delivery based on previously suggested definitions by the major theoretical writers within the field:

Integrated healthcare delivery refers to a coherent and coordinated set of services that are planned, managed and delivered to individual service users and populations across a range of organizations and by a range of cooperating professionals and informal careers. The essence of integrated healthcare delivery is that individuals and populations alike receive - best practice based - services they are in need of, when and where they need them for optimization of health status, and that all services are delivered in a cost-efficient way, seen from a whole system perspective.

This definition is ambitious but useful for policymakers and health system managers as it describes a service system fulfilling the demands of 21st century healthcare as affirmed by the US National Institute of Medicine (16). It should be noted that this definition does not apply only to managed care organizations and European-style healthcare systems; it also applies to free-standing hospitals and other types of individual provider organizations. In the latter case the individual provider organization should assist patients and their relatives in creating virtual alliances between the providers of the patient's choice in order to deliver integrated services to benefit the patient and meet the requirements of 21st century patient centred healthcare.

Figure 1 Conceptual model for assessment of the conditions for integration as an intermediate healthcare system outcome.



Chapter III Materials and methods

In this chapter the material and methods used in the enclosed papers are presented. Please see the papers for the specific information on material and methods used in each sub-study.

3.1 A systematic review of methods to measure integrated healthcare delivery (Paper I)

The review presented in Paper I is based on a systematic approach in terms of selection criteria and a pre-planned search strategy.

Selection criteria

To be eligible for inclusion in the review the stated primary or secondary research objective should be the measurement of integrated health care delivery or an equivalent concept. We choose to focus on structural, cultural and process measures for the purpose of this review. Patient reported perceptions of coordination have been used as a proxy measure for the overall coordination performance of providers (14). This can be a both practical and useful approach, especially when emphasis is on the patient's experience with a single provider or the journey through a system of providers – often referred to as continuity of care within the field (93;103;104). However, the patient's perspective gives limited insight into the many specific clinical activities coordinated into their care, and patients are unlikely to have insight in both system and organisational level integration activities. Furthermore, continuity of care is somewhat different from the other concepts used within the field because it often does not refer to an attribute of healthcare organizations but rather to the subjective perceptions of the patient experiencing coordinated services or integrated care (93;103;104). We therefore decided to exclude studies specifically measuring continuity of care on the basis of patient surveys only. There exists a substantial literature on interprofessional working and teams in health and social care and associated measurement methods (110;111). Although potential relevant these methods are outside the scope of the review. Finally there exist a number of intervention studies evaluating the effect of integrated care programs versus a standard care program (22). Such studies were excluded from this review, unless

the authors clearly had made an effort to measure the concept of integrated health care delivery.

Search strategy

The search was limited to the following bibliographic sources: Medline/PubMed (1960-April 2008), EMBASE (1966- April 2008), Web of Science (1945- April 2008), Cochrane Library (1898- April 2008) and the World Health Organization library & information networks for knowledge database (WHOLIS) (1948- April 2008). To allow for the identification of a wider range of perspectives the search was extended to include grey zone literature such as academic working papers, ministerial reports and measures developed by consortiums or international institutions, with the use of the conventional internet search engines Google and Scholar-Google (January 2008). Publications written In English, Danish, Swedish, Norwegian, and German were included. Studies written in other languages would be included if they had an English abstract and would be subject for translation if found relevant. To systematize the search in Pubmed/Medline terms derived from the literature was used and supplemented with relevant Medical Subject Headings (MeSH®), and limited to studies written in English, German, Danish, Swedish and Norwegian. The following MeSH® term, and words were used (* denotes that different suffixes have been used): “delivery of health care, integrated” (MESH® term); “care pathway*”, “chains of care”, “care coordination”, “care transition”, “clinical integration”, “collaborative care”, “cooperative care”, “coordinated care”, “coordination of care”, “cross sectoral care”, “financial integration”, “functional integration”, “horizontal integration”, “integrated care”, “integrated service network*”, “integration of care”, “intersectoral care”, “intrasectoral care”, “linked care”, “physician system integration”, “provider system integration”, “seamless care”, “service network*”, “shared care”, “transitional care”, “transition of care”, “transmural care”, “vertical integration”, “virtual integration”, “whole system thinking”, “continuity of care”, “care continuity”. The search using these words resulted in 81.078 hits. When restricting the search to papers also including the term “measure*” it resulted in 4515 hits in Pubmed/Medline. The same keywords and combinations of keywords were used to search Web of Science (51 hits), Cochrane library (0 hits) WHOLIS (256 hits) and EMBASE (529 hits).

After the initial search, all title or keywords of the 5351 hits were reviewed by the investigator and a co-investigator who applied the inclusion criteria to determine if the abstract and full paper was needed for further investigation. This process excluded 5194 papers, due to an unrelated subject matter, and the remaining 157 papers were reviewed again in greater detail using a hardcopy of the full papers. In this phase a number of papers were excluded since they only used patient-reported perceptions of coordination as a proxy for the overall coordination performance of providers. Reference lists of the selected publications were searched using a snowball sampling technique and any not previously discovered studies were to be included if found relevant. 17 scientific journal papers and 1 scientific working paper were kept. To search the conventional internet search engines the search was restricted to use the phrases “integrated care” and “measurement system” to identify relevant publications. The search on Google resulted in 753 hits, and the search on Scholar.google resulted in 72 hits. All hits were checked for relevance by the investigator using the inclusion and exclusion criteria and 24 potential relevant publications was identified. Of these 5 was finally kept after a more detailed review of a hardcopy of the publications. Any hits linking to relevant scientific journal papers

where checked to see if these papers were already included. If this was not the case the paper would be included in the review. However, only one additional paper was identified this way. From the final set of 24 publications that met the inclusion criteria, study details were extracted using a standard form. Extracted data included: Name of authors, year of publication, primary of secondary research objective, concept measured, type of data, respondent groups (if relevant). Furthermore, to analyse the identified methods we used a set of criteria from classical test theory and the existing literature within the field of integrated care, including 1) theoretical model, 2) defined concept, 3) defined level of analysis, 4) structural aspects, 5) cultural aspects, 6) process aspects, 7) relative measure (perceived optimal integration included as part of the measure, 8) quantitative measure, 9) internal validity. We considered a criterion to be fulfilled if the criterion was explicitly described in the reference.

3.2 Investigating integrated care and joint health planning in Denmark (Paper II and III)

Sub-study II and III both focused on the Danish healthcare system and used data from a large questionnaire survey among multiple groups of respondents, all characterized as being major professional stakeholders in the Danish healthcare system. I was involved in the entire process of conducting the survey, which was based on a literature review. The survey was conducted in 2005–2006 at the baseline of the Danish structural reform. The survey questionnaires used included items on 1) administration and management, 2) financial circumstances, 3) coordination of healthcare services, 4) preventive services, and 5) rehabilitative services. I was responsible for the items on coordination of healthcare services. The purpose of the large-scale survey was to provide empirical data on the Danish healthcare services at the baseline for the structural reform (see www.sundhedsreform.ku.dk for an in-depth description) and to allow for later follow-up studies.

A specific questionnaire was constructed for each respondent group:

- 1) administrative managers from all counties plus Copenhagen, Frederiksberg and the Regional municipality of Bornholm with county-related functions (N=15) (administrative regional level)
- 2) directors of social and health affairs from all municipalities (N=271) (administrative local level)
- 3) all hospital managers (N=44) (secondary care sector, functional level)
- 4) a random sample of hospital department physician managers (N=200), representing approx. 25% of the total number of relevant hospital departments (secondary care sector, functional level).
- 5) a random sample of general practitioners (N=700) corresponding to approx. 20% of all general practitioners nationwide (primary care sector, functional level)

The wording of the questionnaire items in the four separate questionnaires was finally decided after a two-step testing procedure. The first step was a peer review process among health-service researchers; the second step was a pilot study among representatives from each respondent group. This was done to improve face and content validity.

The administrative managers were identified through the Danish County Council Association representing the Danish counties. The municipal directors of social and health affairs were identified through the Association of Directors of Social and Health Affairs (FSD) and the information was confirmed by telephone when

necessary. The hospital managers were identified through each hospital website if applicable and the information was confirmed by telephone when necessary. All hospital departments in Denmark were identified in order to make a random sample. To identify relevant departments we used the "hospital department classification" available from the National Board of Health. Psychiatric departments and institutions not directly placed at a hospital were excluded as were hospital departments in Greenland and on the Faeroe Islands, which are part of the list from the National Board of Health since these territories are autonomous provinces of Denmark. Departments with a supporting function, such as departments of Radiotherapy, Anaesthesia, Clinical Microbiology, Clinical Biochemistry, Clinical Pharmacology, Clinical Neurophysiology, Departments of Service and Technology and research departments, were also excluded. The random sample of the hospital department managers was selected by computing a randomization routine using statistical software. The names and addresses of all hospital department managers were available from the National Board of Health and because the list was not fully updated, the information was confirmed by telephone. Names and addresses of the random sample of general practitioners were obtained from the General Practitioners' Organization (PLO) register. The randomization procedure was done directly by the PLO.

The postal survey was designed to allow the respondent to maintain anonymity, and two postal reminders were sent to increase the respondent rate. The overall survey response rate for administrative managers was 80.0% (N=12), for directors of social and health affairs 62.4% (N=169), for hospital managers 61.4% (N=27), for hospital department physician managers 70.3% (N=136), and for general practitioners 63.1% (N=442). Data were double keyed-in using EPIDATA.

Sub-study II

This comprehensive data collection allowed for examining and comparing perceptions of clinical integration among major professional stakeholders. Furthermore data was available on strategic, cultural, technical and structural factors, which according to the conceptual framework presented in section 2.1.3., are associated with integration. For the purpose of this study we built on the theoretical framework developed by Shortell et al. to describe the archetypical stages of evolution towards achieving clinical integration, and possible barriers for progressing through these stages (84).

Data from all groups of respondents were used, except from the directors of social and health affairs. Items on achievement of clinical integration were restricted to the three relevant groups of respondents working either at a hospital or in general practice. Respondents with missing data on the relevant items for this paper were excluded. To test for non-response bias we tested whether the survey groups were representative of their group. The distribution of certain characteristics such as sex and practice type was known for general practitioners on a national level. That allowed us to compare respondents to the background population of general practitioners. We used a binominal test of proportions. The respondents were representative regarding sex on a 5% significance level. Regarding type of practice (solo/group or partnership practice) there was a significantly higher number of partnership practices among the respondents (69.5%) compared to the national distribution (63%). For the administrative managers and hospital managers we compared respondents to non-respondents, but could only include information on sex. We used Fischer's exact test. The non respondents did not differ from the

respondents on a 5% significance level. For the hospital department physician managers we confirmed that all counties were represented among the respondents. To present the large dataset we dichotomized the data from the Likert scales mainly used. Response categories "to a high degree" and "to some degree" were recoded as a "yes" and "to a lesser degree" or "not at all" were recoded as a "no". For a very limited number of items the response category "don't know" was available; such a response was regarded as missing information and consequently removed from the analysis.

Sub-study III

The aim of sub-study III was to assess the use of the pre-reform health plans as a tool for strengthening coordination, quality and preventive efforts between the regional and local level of health-care. For the purpose of the study we elaborated the framework developed by Alter and Hage for conceptualizing coordination. Their framework was extended and adjusted to assess healthcare service coordination. At the administrative level the administrative managers and the directors of social and health affairs were asked to assess the influence of the municipalities on the development of the health plans. In another item they were asked to assess the impact of the health plans as a tool for strengthening the coordination, quality and preventive services delivered across sectoral boundaries. Furthermore, they were asked to assess the relative strength of the counties and municipalities in developing health plans. At the functional level the general practitioners were asked to assess the influence of the health plans on their work. Respondents with missing data on the relevant items for this paper were excluded, leaving 11 administrative managers (73% of total included in the survey), 163 directors of social and health affairs (60% of total included in the survey), and 429 general practitioners for the analysis (61% of total included in the survey). The perceived influence of health plans in counties, municipalities, and in general practice was analysed by descriptive statistics. Fisher's exact test was used to assess the difference in perceptions between the respondents in the counties and those in the municipalities.

3.3 Comparing Kaiser Permanente with the Danish healthcare system (Paper IV and V)

Comparative, multi-country research has been underutilised as a means to inform health system development (112). This is despite comparative analysis being a powerful tool to highlight weaknesses and strengths in healthcare systems (4;113). Given the complexity of healthcare and the plethora of healthcare systems, comparative studies can generate the evidence necessary to make politicians and planners aware of a fuller array of policy options (4;114). Sub-study IV and V were thus conducted as comparative studies. This was done with open eyes to the complexity involved when conducting comparative research where one must be aware that healthcare systems differ at many aspects at the same time. The specific configuration of any healthcare system depends on the historical and cultural context of health and healthcare that varies across and within countries. What constitutes an appropriate healthcare system is thus highly context dependent (113;115-117).

Sub-study IV

To make a meaningful comparison of the level of clinical integration in Kaiser Permanente, Northern California (KPNC) and the Danish healthcare system (DHS) it was necessary to obtain information on how the two healthcare systems compared regarding

population characteristics, professional staff, delivery structure, utilisation and quality measures, and direct costs. We focused on the California regional (KPC) identifying secondary data sources that were as comparable as possible. KPC data came from automated data systems, the national Healthcare Effectiveness Data Information Set, published reports, and an internal member survey. DHS data came from government ministry reports, national registries, professional organizations, published reports, the Organization for Economic Co-operation and Development, and World Health Organization reports. The statistical significance of differences in prevalence rates of chronic conditions was assessed with the Chi-square test. Additionally, to increase comparability, we adjusted the cost data in several ways. First, we converted Danish gross expenditures in Danish kroner (DKK) to USD using 2000 purchasing power parities (PPP). We then subtracted capital depreciation and profit from gross expenditures to obtain operating expenditures for each system. As dental benefits vary between the systems, we excluded these costs. We also excluded long-term nursing care expenses from DHS' costs, because, while the figures reported to the Organization for Economic Co-operation and Development include these costs, the care is provided and funded by the municipal social service system. Long-term nursing care for KPC was not included because it is paid for by individuals, supplemental long-term care insurance or governmental agencies. Danish income data were converted to US dollars using PPP conversion rates. We then stratified Danish healthcare costs into age, education, and household income categories. By applying the characteristics of the KPC population to these stratified costs, we adjusted the per capita Danish costs for differences between the populations.

Sub-study V

Several researchers have developed models and frameworks for categorizing and assessing vertically integrated health systems (102;118-120). However, few methods to measure integrated healthcare delivery are validated and even fewer are validated across system settings (14;99;121). We built on the theoretical framework developed by Shortell et al., in which clinical integration is identified as the most important form of integration (see chapter II) (15). In order to compare primary care clinician's perception of clinical integration in Kaiser Permanente, Northern California (KPNC) and the Danish healthcare system (DHS) we operationalized the concept using three core aspects: timeliness of information transfer, agreement on roles and responsibilities, and established coordination mechanisms (14). The primary care clinicians' perceptions of these aspects were examined by asking how often these three aspects occurred when care was transferred across clinicians (e.g. from a specialist to the primary care team). The answers were given on a 5-step Likert scale (Never – Always). We dichotomized these variables assigning 0 (never, rarely, or sometimes) or 1 (usually, always). By combining the three dichotomized variables using a summated score (0, 1, 2, 3), we gained a scale measure of clinical integration. We used Cronbach's coefficient, α Cronbach, to determine the internal consistency of the scale (122). The observed value of α Cronbach for the three dichotomous response variables was 0.71 which is generally considered acceptable for similar scales (123;124). Data were collected in both settings in 2006/2007 by using a survey instrument designed to measure organizational characteristics and care management practices among primary care clinicians. In DHS the profession comparable to KPNC's primary care clinicians is general practitioners (GPs). The survey instrument was developed specifically for use in KPNC, and to collect compa-

table data in the Danish context we used a three-stage process to translate the IMPACT2 survey into Danish. This process was used to improve face and content validity (123). First, forward-backward translations were made using two independent professional translators (from English to Danish) and an expert group of health-service researchers. Inconsistencies were discussed until consensus was reached. Second, the survey underwent a peer review process among health-service researchers outside the research group, and finally we performed a field test among GPs. Special attention was given to reach conceptual and semantic equivalence (125) and ambiguous items were excluded. Thus comparable surveys were sent to 1103 primary care clinicians in KPNC and 700 general practitioners in DHS. Response rates of 61% were achieved in both settings after reminder procedures. The data were double keyed-in using Captiva Formware (<http://dorent1.kaiser.org/resources/dataentry/index.shtml>) and EPIDATA. We applied a logistic regression model to estimate the association between healthcare system setting and each of the binary response variables (timeliness of information transfer; clear roles and responsibilities; established coordination mechanisms). We analysed the ordinal scale of clinical integration using a proportional odds logistic regression model. Proportional odds logistic regression models were made for the healthcare system setting analyses as well as for each of the separate systems to identify organizational factors associated to clinical integration. Analyses were limited to respondents with complete information on all the included explanatory variables. In the Danish setting we included an interaction term between practice size (in terms of no. of patients) and practice type. For all tests we did corrections for multiple testing, with a correction procedure based on a 5% false discovery rate (FDR). We conducted a test for non-response bias in both settings using a binomial test of proportions and a 5% significance level. In KPNC we had full information from automated registries on sex, years of experience, and ethnicity on both respondents and non-respondents. In DHS we had no information on non-respondents; accordingly, we tested whether the surveyed group of GPs was representative of their group on a national level using information on sex, regional setting, and practice type provided by the Danish General Practitioners Association. All statistical analysis was done using the statistical computer environment 'R' (126). The Design Package was used to fit the regression models (127).

Chapter IV Results

In this chapter the results of the five sub-studies are presented.

4.1 Measurement of integrated healthcare delivery – A systematic review

18 scientific journal papers (10;99;102;121;128-139;158,159), 1 academic working paper (140) and 5 other publications (37;141-144) describing methods to measure integrated healthcare delivery were identified. The identified methods were published in the period from 1979-2007, most of them from 2000 and beyond. The variety of concepts measured clearly reflect the conceptual diversity used within the field. There exists no consensus on which data sources best captures integrated health care delivery. The identified studies can be categorized according to type of data source; a) questionnaire survey data, b) automated register data, or c) mixed data sources. Questionnaire surveys are, however, the most widely used data source. Only two of the identified papers relied solely on automated register data. A special category is the methods developed by international consortiums.

These are mainly relevant for macro level accreditation processes or international health system comparisons.

In the identified references we identified 24 different methods to measure integrated healthcare delivery. However five methods shared theoretical framework. For each of the methods published in scientific journals (including the scientific working paper) we assessed whether they fulfilled the criteria. Currently none of the identified measures fulfil all of the proposed criteria, however some are highly developed. Almost all methods are based on a theoretical model; however, some more rigorously than others. In most papers the concept being measured is clearly defined and all papers have defined the level of analysis. Structural and process aspects are often included in the measurement methods, while cultural aspects are rarely a part of the methods. Only one paper describes a method that measures integration relatively to a perceived optimal integration target. Almost all of the identified methods allow evaluators to quantify their findings, but only a few to calculate sums and mean ranks of a combined measure of integration. While a test for some degree of internal validity has been described in nine of 19 papers published in scientific journals (including the academic working paper), none have still been thoroughly validated across different settings.

4.2 Does a public single payer system deliver integrated care?

At the gatekeeper level the Danish general practitioner (GPs) are divided when asked whether patient pathways in general are appropriately coordinated within the healthcare system. Half of the GPs do not consider patient pathways in general to be appropriately coordinated. The hospital department physician managers are in close contact with patients being transferred across sector boundaries to receive care. When asked how often a patient who requires care across sector boundaries receives well coordinated care, more than half (52%) of the hospital department physician managers reported that half or less than half of the patients experience well coordinated care. Both the hospital managers and the hospital department physician managers experience a high degree of coordination within the hospital. However, within both groups almost half do not consider clinical facilities and services within the healthcare system in general to be appropriately coordinated.

Challenges on strategic, structural, technical and cultural dimensions were identified. Most professional stakeholders at the three management levels (region, hospital, and hospital department) give high priority to coordination of care and collaboration. However, there is a clear trend when moving down in the organizational hierarchy where a lower priority is demonstrated. The use of strategies and vision to coordinate care is used to a high degree by most hospital department physician managers, but mainly within their own department and less in coordinating care with other hospital departments or GPs. Regarding the cultural dimension, GPs are in general satisfied with the collaboration with hospital physicians regarding individual patients. The survey showed that 81% of the GPs always/ or almost always, or often are satisfied. When asked about inhibiting factors for collaboration, cultural issues, such as lack of understanding of GPs' work and lack of prioritization of collaboration from the hospital physicians, are perceived as inhibiting factors by 71% of the GPs. At the hospital management level 64% state that they encourage collaboration and coordination between hospital departments and GPs; however, financial incentives are not used to encourage the collaboration and coordination. Most hospital managers (77%) state that the health professional staff shares objectives in their daily work. Challenges related to a technical dimension were also identified, focusing on health information technology (HIT) capa-

bilities and use; 73% of regional administrative managers find that HIT systems are used inadequately to strengthen the conditions for coordinated care pathways. This is confirmed at the secondary care functional level; where 73% of hospital managers state that their hospital does not use a shared electronic patient record (EPR) across internal departments. Regarding the use of EPR across hospitals within the regional county – this number is even higher at 81%. At the hospital department level, HIT based data exchange was most widely used to coordinate activities within the department and was less used to coordinate activities with other departments at the hospital (36%), and other departments at other hospitals (19%), or with GPs (12%). Structural challenges were identified. Approximately three-quarters of regional administrative managers find laws and regulations as well as reference programmes and patient pathways to be used to an inadequate extent. However, almost two-thirds of the regional administrative managers express that administrative health plans are used to an adequate extent to strengthen the conditions for coordination. At the secondary care functional level, 80% of hospital managers state that coordinating units or persons are used to coordinate activities across hospital departments; 37% use coordinating units or persons to coordinate activities with other hospitals and 64% use coordinating units or persons to coordinate activities with GPs. The hospital department physician managers also use coordinating units or persons; 78% of all department managers use these to coordinate activities within the department, and 52% to coordinate activities with other departments at the hospital. Fewer use coordinating units or persons to coordinate activities with other departments at other hospitals (16%) or with GPs (21%).

To sum up, when seen from the perspective of major professional stakeholders at the administrative and functional levels of the Danish healthcare system, the system has not yet achieved its explicit goal of providing an integrated delivery of services when it comes to care delivered across sector boundaries. The study suggests the need for increased managerial stewardship, use and alignment of the financial incentives and an expanded use of health information technology to link sub-organizations within the healthcare system.

4.3 Are joint health plans effective for coordination of health services?

The administrative managers in the counties and the directors of social and health affairs in the municipalities agree that the municipalities to some or to a lesser degree have an influence on the development of the health plans. Even though there is overall agreement, a slightly higher proportion of administrative managers in the counties state that the municipalities have a high or some influence on the development of the health plans than do the municipalities represented by the directors of social and health affairs. A majority among all the stakeholders at the administrative level agree that the development of health plans is primarily decided by the counties. However, it is interesting that the assessment of the relative strengths depends on whether the respondent holds a position in a county or in a municipality, since a higher proportion of the directors of social and health affairs compared to the administrative managers find that health plans are predominantly decided by the county (87% vs. 64%). A majority of all stakeholders on the administrative level agree that the health plans have a limited influence in terms of fulfilling the objective of strengthening coordination, quality and preventive services between the county at the regional level and the municipalities at the local level. In spite of the overall agreement, a

higher proportion of administrative managers assess the impact of the health plans negatively compared with directors of social and health affairs in the counties. Since a majority in both groups agree that the health plans are primarily decided by the county, it is surprising that the dominant stakeholder is the less positive. At the functional level of healthcare the general practitioners often play a key position in the patients' initial and ongoing contact within the healthcare sector. Among these front-line stakeholders a large proportion (27%) of the general practitioners are not familiar with the health plans, despite a clear intention in the health planning act to involve them in the development of the plans. Amongst those familiar with the health plans (73%), approx. 61% report that the health plans influence their work as a general practitioner to only a lesser degree or not at all. Only 6% of the general practitioners state that health plans influence work as a general practitioner to a high degree.

4.4 Input and performance of the Danish healthcare system and Kaiser Permanente

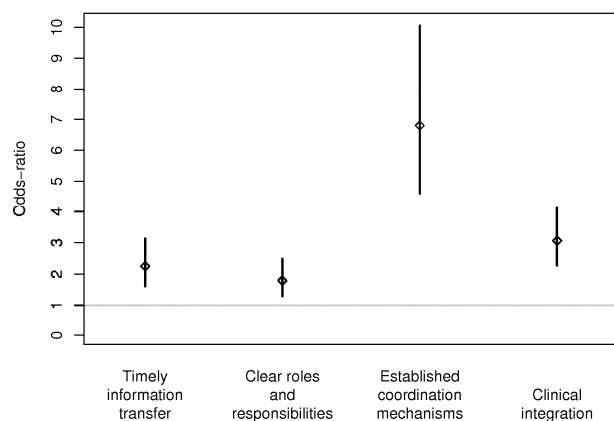
Operating expenditures for Kaiser Permanente, California (KPC) and the Danish healthcare system (DHS) were similar at purchasing power parities (PPP) \$12,975 million and \$12,535 million. Per capita expenditures were higher for KPC at PPP \$1,951, compared with PPP \$1,845 for the DHS. Adjusting for different distributions of age, education and income yielded Danish per capita expenditures of PPP \$1,480; 24% less costly than at KPC. Observed quality measures appeared higher in KPC (145). Hospital beds in KPC were occupied 270 days per 1000 persons per year, compared to 814 days per 1000 persons per year in the DHS. Acute care admission rates showed a similar spread: 7 per 1000 persons per year in KPC and 18 per 1000 persons per year in Denmark. The length of stay for acute admissions averaged 3.9 days at KPC and 6.0 days in Danish hospitals. Stroke patients displayed the most remarkable difference in average length of stay. They remained hospitalized an average of 4.26 days at KPC, compared to 23 days in DHS. At KPC, cardiovascular angioplasty rates were 25% higher and the rate of coronary bypass grafts was twice that of the DHS. KPC also had higher kidney transplantation rates (4.8 per 100,000 compared to 2.9 per 100,000). KPC had higher rates for breast cancer screening (78% vs. 10%), retinal screening among patients with diabetes (93% vs. 46% in the only reporting Danish county), and beta-blocker use among patients with acute myocardial infarction (93% vs. 69%). Screening rates for cervical cancer were roughly comparable at 80% and 75%. Based on the results, KPC uses more resources per capita but also shows superior performance on the selected quality measures.

4.5 A comparative analysis of clinical integration in the Danish healthcare system and Kaiser Permanente

More primary care clinicians in Kaiser Permanente, Northern California (KPNC) experience to be part of a clinical integrated environment than did general practitioners (GPs) in the Danish healthcare system (DHS) (Figure 2), even when taking into account differences in years of experience, sex, and working hours as well as corrections for multiple testing. The adjusted odds ratios of perception of clinical integration for primary care clinicians in KPNC relative to GPs in DHS was 3.06 (95% CI: 2.28, 4.12). The adjusted odds ratio of a KPNC respondent giving a positive response to the item on timeliness of information transfer was 2.25 (95% CI: 1.62, 3.13) compared to GPs in DHS. In other words, consider the example of a male respondent in the KPNC system with 15 years' of experience and working full-time – the logistic regression predicts with a probability of 68% (95% CI: 61% - 74%) that he usually or always finds information transfer timely. The

analogous probability for a Danish male GP with at 15 years' of experience and working full-time was 48% (95% CI: 42%-54%). For the other two sub-aspects of clinical integration: agreement on roles and responsibilities (OR = 1.79, 95% CI: 1.30, 2.47) and established mechanisms in place to ensure effective handoffs (OR = 6.80, 95% CI: 4.60, 10.06) system setting has a significant effect. In the study the system specific analysis of clinical integration showed that none of the explanatory variables considered, health information technology (HIT) included, could account for a substantial proportion of the system specific variation in clinical integration, especially when including corrections for multiple testing.

Figure 2 Odds-ratios and the corresponding 95% confidence intervals for the effect of system setting (Kaiser Permanente, Northern California vs. the Danish healthcare system) on clinical integration and sub-aspects of clinical integration adjusted for differences in years of experience, sex, and working hours per week.



Chapter V Discussion

In this chapter the principal findings of the thesis are discussed in the light of the existing literature. The methodological limitation and strengths, which should be considered when interpreting the findings and their implications, are then presented.

5.1 Discussion of principal findings

In the first chapter of the thesis an overview of the literature was presented highlighting the main arguments for why research within the field of integrated care is needed. It is increasingly being recognized that a lack of coordination can be a matter of life and death for individual patients; additionally it is potential costly for healthcare systems in general. Despite its importance in modern healthcare-system reform the concept of integrated healthcare delivery is difficult to grasp. Thus, in chapter II of this thesis a conceptual framework is suggested, and a conceptual model for assessment of the conditions for integration as an intermediate healthcare system outcome is presented. The model combines theoretical elements from Shortell et al. (84) and Alter and Hage (95) and contributes to the field by showing how external and internal conditions could facilitate or inhibit coordination processes fostering integration. The chronic care model developed by Wagner et al. views chronic disease management as part of the larger health and social care system (9). Our model can be seen as elaborating on integration as a sub-aspect of organization of healthcare as depicted in the chronic care model (9). According

to MacAdam (3) at least four other frameworks of integrated care are available in the literature (98;146-148). None of the framework focuses specifically on the link between coordination, integration and health, although the Hollander-Prince and Kodner-Spreuwenberg frameworks put emphases on characteristics of integrated care systems (147;148). These frameworks are, however, most useful for guiding policymakers and others on best practices for coordinating care.

In Paper I a contribution to the field was made by conducting a systematic review of methods to measure integrated health care delivery. The findings of our review are comparable to the findings of the few existing reviews that have been conducted on this subject (14;32;149). However, our review updates the literature and applies a systematic approach to identify measurement methods on integrated healthcare delivery within the healthcare literature.

In Paper II the degree of clinical integration in the Danish healthcare system (DHS) was measured. The study suggests that despite a range of interventions, Denmark has not yet fulfilled the objective of delivering integrated services to all Danish patients in need of such services. The study was conducted from the perspective of professional stakeholders. Strategic, structural, cultural, and technological barriers were identified. These findings are useful in a policy context for informing decision makers about the extent of the challenges and possible barriers. In Paper III, which also focused on the Danish setting, it was described how joint health plans from a theoretical perspective do not match the degree of complexity in the healthcare system. It was therefore in agreement with the theoretical framework that a majority of the professional stakeholders agreed that joint health planning, despite being one of the key policy tools to ensure coordination, has not been a particularly effective tool for coordination. This finding supports the available qualitative studies that have been conducted on joint health planning in Denmark (38;150), and the results can now be generalized to a national level. In an international context the empirical evidence can contribute to the limited literature on policy tools for coordinating an integrated provision of care.

As described in chapter I Kaiser Permanente has been highlighted as a successful model of integrated and cost effective care with high quality services. When compared with the DHS Kaiser Permanente, California uses more resources per capita and shows superior performance on the selected quality measures. These results, as presented in Paper IV, support earlier findings comparing Kaiser Permanente with the NHS in the United Kingdom (75-77;81-83), a system that shares many organizational characteristics with the DHS. By measuring the level of clinical integration in Kaiser Permanente, Northern California (KPNC), using the DHS as a point of reference, Paper V contributes to the literature that points to the importance of highly coordinated service delivery as a driver of the performance results of Kaiser Permanente (75-77;81-83). When focusing on KPNC, the largest of the regional entities, more primary care clinicians reported being part of a clinically integrated care environment than did general practitioners in Denmark. This was shown for all the sub-aspects of clinical integration, including: timeliness of information transfer, agreement on roles and responsibilities, and established coordination mechanisms in place to ensure effective handoffs. Caution must be advised before making concrete conclusions due to the complexity of the matter and before our findings are validated in new studies using alternative measurement methods.

Bodenheimer has described the analysis of regional health information systems as being in its infancy; however health informa-

tion technology (HIT) is often depicted as a panacea for some of the coordination challenges in modern healthcare systems (6). However, an association between clinical integration and implemented HIT in KPNC or available HIT in the Danish setting could not be shown. Given such a causal relationship between HIT and clinical integration exists, the reason for us not being able to find an association could be the following: the primary care physicians in KPNC report a general high level of implemented HIT, giving a right skewed distribution, and the sample is too small to make use of the variation that exists. In the DHS, HIT tools that allow general practitioners to coordinate with healthcare professionals outside the practice are not widespread. From the limited list of HIT features available we made an effort to select HIT features that imply cross-system collaboration. However, the lack of an association could reflect that in the Danish setting HIT tools are not yet sufficiently developed to influence the level of clinical integration. More studies, especially follow-up studies, are needed to investigate this area further. In the Danish setting it was somewhat surprising that practice type, number of patients and number of professions, employed as support staff, were not associated with clinical integration. This could be attributed to an adaptation process in a general practice where each GP adjust his or her working procedures to facilitate the number of patients assigned to the given practice. Larger practices could adapt by employing more support staff, while smaller practices could manage without widespread support. However, further studies are warranted and necessary since arguments for grouping of GPs in larger units with more support staff are often raised in the Danish health policy debate.

5.2 Methodological considerations

The field of integrated healthcare delivery is in its early phase, and there is no consensus on concepts and preferred research methodology (3;99). This was a significant challenge but also an opportunity to be involved in a process of breaking new ground. Consequently, conducting a systematic review of methods to measure integrated healthcare delivery was not straight forward, since the terms are not used systematically in the literature (3;99). To overcome this challenge the search presented in Paper I was conducted more broadly than would have been necessary as there has been a higher degree of conceptual clarity within the field. Despite the broad scope of the systematic search, this also means that studies that should have been included may have been undetected. By having two independent researchers going through the literature and using a snowball sampling technique that continued until the same references kept appearing, the majority of relevant methods described within the healthcare literature should have been included in the review presented in Paper I. For the grey-zone literature, this cannot be said with the same level of certainty. Likewise updated literature searches should also be made within other research fields, e.g., in educational sciences where discussion of integrated services delivery is also an ongoing issue (149). Caution must, however, be exercised in attempts to transfer such findings into the context of healthcare systems.

Cross-sectional surveys using questionnaires were used to collect data for Paper II, III and V included in this thesis. The systematic review showed that surveys were a frequently used method to measure integrated healthcare delivery. Such quantitative research, which by definition deals with quantities and relationships between attributes is appropriate in situations where there is a pre-existing knowledge, which permits the use of standardised data collection methods (151). This was the case in the Danish

setting where a series of qualitative case studies had identified problems of information exchange between sectors and had described disease-specific gaps in the healthcare system (see chapter I). The next step was therefore to document prevalence and to build hypotheses on possible facilitating and inhibiting factors, which the cross-sectional design is appropriately suited for (151). Since cross-sectional surveys are a relatively economical method in relation to time and resources—as large numbers of people can be surveyed quickly, and standardised data are easily coded (151)—the approach allowed me to include and compare data from multiple groups of respondents. I find this approach, which I named the MaPS (Major Professional Stakeholders) approach, beneficial when investigating clinical integration, because the research area by definition includes collaboration processes between multiple settings within a complex healthcare system. To my knowledge, our surveys are the first to include a broad set of stakeholders and among the most comprehensive conducted on care coordination in a Danish context. This allows for provision of a complete and national representative overview of how major professional stakeholders perceive integration of care in the Danish healthcare system. The main limitation of the cross-sectional design is that it cannot be used to establish causality; it can only point to statistical associations (151). It would therefore not have been an appropriate design had the research aim been to measure the effect of clinical integration on system performance or to establish causality between organizational factors and clinical integration. In subsequent studies causality can be investigated by repeating the data collection over time; however, the complexity involved in conducting such a follow-up study would still be substantial. Since the data collection was conducted at the baseline of the implementation of the Danish structural reform, the data is also suited for follow-up studies investigating the impact of the reform process on the functionality of the Danish healthcare system.

Sub-study II, III and V are based on professional stakeholders' perceptions using a self-reported data approach. An advantage of self-reported data is that researchers are not dependent on available automated data and can define and collect variables of interest to an integrated delivery of healthcare services. From a theoretical standpoint it makes sense to measure perceptions, since coordination processes have been shown to depend on the cultural environment and willingness to collaborate is a key factor (95). Self-reported measures are well established in the research literature; nevertheless we cannot rule out that the questions are interpreted differently across settings. Therefore studies using data on coordination from, e.g., automated registers are needed to triangulate our findings. Automated data, such as repeated diagnostic testing or readmission patterns, could be seen as less sensitive to cultural differences; however, other challenges may arise when using such data, e.g., biased estimates could be introduced in cases where there were differences in financial incentive structures that would make physicians more likely to compute such data into registries than in systems where they were not rewarded for such behaviour. In the papers enclosed in this thesis we used data from managers, directors and clinicians. Lessons on integration can therefore mainly be learnt from an organisational and management perspective, as well as from a clinical perspective. Further studies within the Danish context should investigate the patient's perspective. Research are also needed on integration from an economic perspective focusing on gaps and overlaps in service delivery.

In the comparative study of Kaiser Permanente, California and the Danish healthcare system, population characteristics, professional

staff, delivery structure, utilisation, quality measures and direct costs were compared. Comparative studies are extremely complex and caution is therefore warranted when interpreting the results (4;114). Our analysis revealed a 24% per capita cost differential between KP and the DHS; however, the use of purchasing power parities (PPP), which is a frequently used method to compare international health care costs, overlooks the fact that variations in health care prices are not necessarily consistent with the general price variation, and PPP also overlooks the relative prices of inputs (152;153). However, we made an effort to avoid some of the criticism of earlier comparisons (80) for example by stratifying Danish healthcare costs into age, education, and household income categories.

When comparing clinical integration in KPNC with that in the DHS, it was a limiting factor for the comparative analysis that the survey, as applied in the Northern California setting, was already developed and that alteration was not an option. We therefore had to be very careful when constructing the Danish version of the survey, and special emphasis was put on conducting a thorough pilot test to improve the conceptual equivalence between the settings. We selected the items to measure sub-aspects of clinical integration based on a theoretical framework (11;15), which I consider a strength of our approach, and the internal consistency of the multi-item measure was acceptable. Cronbachs' coefficient is a frequently applied tool for determining the internal validity of a scale. However, it is a relatively simple approach with obvious limitations, since a unidimensional scale (having an underlying latent trait), is not necessarily reliable, internally consistent or homogeneous. Cronbachs' coefficient can be high even if there is no general factor, since it is influenced by the number of items and parallel repetitions of items, it increases as the number of factors pertaining to each item increases, and it decreases moderately as the item communalities increase (124;125;154). Thus we propose a first step to measure clinical integration, measurements methods should be refined and different approaches, both quantitative and qualitative, should be applied to validate and triangulate results. It is generally a strength of the studies that we obtained reasonable response rates, especially in the US context where response rates tend to be low among physicians (155-157). In all relevant studies we conducted non-respondent analysis using available information and thereby making it clear if a sub-sample differed from its group.

Chapter VI Conclusion and Perspectives

6.1 Conclusion

Based on the five papers enclosed in this thesis it can be concluded that:

- I) Integrated healthcare delivery can be measured: methods are available and some are highly developed. However, the method selected depends on the objective. Due to the relative newness of this area established of the shelf measures are not yet available. Criteria for development of measurement methods are suggested. Further development should be based on an explicit conceptual framework and should focus on simplifying and validating existing methods.
- II) Seen from the perspective of major professional stakeholders at the administrative and functional levels of the Danish healthcare system, the system has not yet achieved its explicit goal of providing an integrated delivery of services. The study suggests a need for increased managerial stewardship making it clear to all

health professionals that coordination of care is a core strategic priority. Key elements could be financial incentives and an expanded use of health information technology to link sub-organizations within the healthcare system.

III) For more than a decade the provision in the health planning act has provided the formal framework for system-level health planning and coordination between the stakeholders in Denmark. The study showed that the majority of stakeholders at the administrative level of the Danish healthcare system agreed that joint health plans have not been effective as a tool for coordination. The development of the health plans has been dominated by the regional level, and general practitioners have not been adequately included in the health planning process. Policymakers and health managers should be aware that coordination through joint planning is a necessary expense when there is an overall systemic vision of a connected delivery of services. Joint health planning should foremost actively engage all stakeholders and a high degree of recurrent feedback between the stakeholders is warranted.

IV) Compared with the Danish healthcare system, our findings suggest that Kaiser Permanente in California has a population with more documented disease and higher operating costs, while employing fewer physicians and resources such as hospital beds. Kaiser Permanente consistently performed better than the Danish healthcare system on the observed quality measures.

V) More primary care clinicians in the managed care organization Kaiser Permanente, Northern California reported being part of a clinically integrated environment compared to general practitioners in the Danish healthcare system. None of the considered organizational factors, within each system, explained a substantial proportion of the variation in clinical integration. The preferred strategy to improve clinical integration must be based on evidence on the current level of clinical integration, intra-system variations and a clear understanding of facilitating factors.

6.2 General political and practical implications of the study results

Since coordination of care is an explicit aim of the Danish healthcare law and has been a policy focus area for more than three decades, the findings of this thesis are discouraging. However, the findings can help to assist policymakers, health planners and managers – in Denmark and in countries facing similar issues – to find the future direction to achieve a higher level of clinical integration. In Denmark managers must strive to enlighten the health professionals that coordination is a core strategic priority. This calls for strong leadership that can change the cultural beliefs, values, norms, and behaviours within the systems that inhibit collaboration across sectors. A key element in such a cultural transition could be the use of financial incentives. It is of utmost importance that financial incentives are aligned with other specific managerial demands in order to encourage healthcare professionals to focus more on cross-system quality improvements and not only on internal quality improvements. The findings of this thesis also suggest that the build up of a comprehensive health information technology system is needed and that the ongoing work with implementation of clinical guidelines and reference programmes should be continued. The organizational and financial structure of the Danish healthcare system could be used to facilitate clinical integration, since the entire healthcare system is under ministerial regulation and under the control of public authorities directly or indirectly through contracts and agreements with independent providers. Such organizational and financial premises, with a hierarchical structure, allow the public

authorities, especially the regions, to set priorities and alter the system in ways they find fit to facilitate clinical integration. The large-scale structural reform implemented in the Danish healthcare system in January 2007 did not significantly alter existing boundaries at the functional level of medical care provision. A key point is, however, that policymakers, health planners and managers should not aim to eradicate boundaries within healthcare systems. Such boundaries are often necessary, inevitable and desired to achieve the benefit of specialization. The Danish health system, however, is organised to harvest the benefit of specialization, without investing the resources needed for coordination when there is an overall vision of a connected delivery of services. The policy and organizational tactics should therefore be directed not at eliminating boundaries but at making sure they function well to benefit the recipients of care. Joint health planning is needed to achieve delivery of coordinated services across the system. However, as shown in this thesis, a majority of the stakeholders at the administrative level in the Danish setting agree that health plans have not been effective as a tool for coordination. Efforts must therefore be made to overcome barriers hampering efficient whole system planning. Joint health planning should foremost actively engage all stakeholders and a high degree of recurrent feedback between the stakeholders is warranted. Danish policymakers and health system planners must work out local solution to local challenges, but much can be gained by collaborating and learning from other healthcare systems facing similar challenges. One key message from the constructive debate on Kaiser Permanente is that policymakers, health system planners and medical practitioners to an increasing extent are realizing that increased investment alone will not provide the health services that are the most beneficial to the overall health of the European populations. Fundamental changes in the way services are organized and managed will also be necessary as well as a shift in the priorities between primary care and specialized hospital care. To direct policy efforts and assist health system planners in potential reorganization of European health systems, we need to strengthen the evidence base by having detailed research conducted comparing Kaiser Permanente and like systems with a broader spectrum of European healthcare systems. Such research may enlighten us whether approaches' of alternative healthcare models are efficient compared with existing European care practices. Data sources and techniques for doing comparative studies must be refined and more in-depth analysis of the potential of transfer of selected programmes and system elements to a European setting must be encouraged.

6.3 Future research

With this thesis an initial step has been taken into a new research field of immense importance. It is my hope that the thesis contributes to the field and that ongoing research will make it possible for researchers to deliver evidence based guidelines to policy makers and healthcare planners and managers. Research on integrated healthcare delivery is challenging due to the inherent complexity involved in coordination processes between multiple stakeholders; however, it is also rewarding since it has the potential to shape delivery systems in two distinct ways. First it provides evidence to policymakers and planners on the alternative array of options and policy tools. Second, research on integrated care delivery has the potential to shape the way that health professionals and patients perceive their own position and responsibilities within the system. Future research is at least needed on four different levels: 1) conceptually and theoretically, 2) methodological 3) on the costs and benefits to society, healthcare

delivery systems, healthcare professionals and most importantly to patients and 4) on how to implement and sustain change in different healthcare system settings. More research is needed on a theoretical level to develop an understanding of conceptual frameworks. Theoretical work is needed to guide the development of measurement methods. In chapter II it was shown how the field on integrated healthcare delivery can be seen as approaching the field from different perspectives. Researchers should in future studies be explicit regarding their perspective and which type, form, and level of integration they are investigating. Researchers should then choose definitions and measurement methods accordingly. Some of the existing measurement methods have already been highly developed, and there is a need for conducting follow-up studies and validating existing methods across settings. However, for most perspectives new methods must be developed. This could be done using the suggested criteria and research directions provided in Paper I. In this thesis a method to measure clinical integration and sub-aspects of clinical integration has been proposed and the scale has been shown to have acceptable internal consistency. The measurement method should be further refined and should be validated within and across settings. Different approaches both quantitative methods, e.g. using automated register data, and qualitative methods should be applied to triangulate the results. Qualitative studies could with benefit investigate if the method holds conceptual and semantic equivalence when applied in different settings (125). Valid measures will facilitate studies evaluating the effectiveness of care coordination interventions using a randomized controlled trial design. The comprehensive dataset collected as part of this thesis at the baseline for the implementation of the major structural and financial reforms in Denmark, is perfectly suited for follow-up studies. Such studies will allow researcher to gain important insight in the impact of large scale reform e.g. on integration challenges. Finally there is a need for research in implementation of care coordination interventions in complex system settings and how managers can build healthcare environments that can accommodate delivery of coordinated care services. It is still an open question whether an organizational structure that unites a financing group with all providers – from hospital, clinics, and physicians through home care and long-term care facilities to pharmacies, is better suited for delivering integrated care than e.g. independent provider organizations bound together through virtual partnerships e.g. by the use of health information technology (100;101).

Summary

The positive outcomes of coordination of healthcare services are to an increasing extent becoming clear. However the complexity of the field is an inhibiting factor for vigorously designed trial studies. Conceptual clarity and a consistent theoretical framework are thus needed. While researchers respond to these needs, patients and providers face the multiple challenges of today's healthcare environment. Decision makers, planners and managers need evidence based policy options and information on the scope of the integrated care challenges they are facing. The US managed care organization Kaiser Permanente has been put forward as an example for European healthcare systems to follow, although the evidence base is far from conclusive. The thesis has five objectives: 1) To contribute to the understanding of the concept of integration in healthcare systems and to identify measurement methods to capture the multi-dimensional aspects of integrated healthcare delivery. 2) To assess the level of

integration of the Danish healthcare system. 3) To assess the use of joint health plans as a tool for coordination between the regional and local level in the Danish healthcare system. 4) To compare the inputs and performance of the Danish healthcare system and the managed care organization Kaiser Permanente, California, US. 5) To compare primary care clinicians' perception of clinical integration in two healthcare systems: Kaiser Permanente, Northern California and the Danish healthcare system. Further to examine the associations between specific organizational factors and clinical integration within each system.

The literature was systematically searched to identify methods for measurement of integrated healthcare delivery. A national cross-sectional survey was conducted among major professional stakeholders at five different levels of the Danish healthcare system. The survey data were used to allow for analysis of the level of integration achieved. Data from the survey were additionally used to investigate the use of joint health planning as a tool for coordination of regional-local healthcare delivery. Analysis of secondary data from the Danish healthcare system and Kaiser Permanente, California were used to compare population characteristics, professional staff, delivery structure, utilisation, quality measures and direct costs. A cross-sectional survey among primary care clinicians in Denmark and in Kaiser Permanente, Northern California was completed to allow for comparison of clinical integration in the two systems and system specific associated factors. In this thesis a conceptual framework and a model for assessment of the conditions for integrations as an intermediate healthcare system outcome are presented. Furthermore, the results show that integrated healthcare delivery can be measured: 24 methods are available and some are highly developed. However, the field is still in its early phase and guidelines for how to proceed is devised. It was confirmed on a national level that integration of care is a widespread challenge, and that only half or less than half of patients in need of integrated services receive such care. Options for decision makers and managers are discussed. From a theoretical perspective joint health plans as applied in Denmark do not match the degree of complexity in the healthcare system. It was therefore in agreement with the theoretical findings when major stakeholders agreed that the joint health plans had not been effective as a tool for coordination. Joint health planning processes should actively engage all stakeholders and a high degree of recurrent feedback are warranted. When comparing Kaiser Permanente, California with the Danish healthcare system, our study suggest that Kaiser Permanente has a population with more documented disease and higher operating costs, and performs better than the Danish healthcare system on the observed quality measures. Substantially differences were found in the perception of clinical integration in the two settings. More primary care clinicians in the Northern California region of Kaiser Permanente reported being part of a clinical integrated environment than did Danish general practitioners. By measuring the level of clinical integration in Kaiser Permanente using the Danish healthcare system as a point of reference our findings support the literature that points to the importance of integrated healthcare delivery as a driver for the performance results of Kaiser Permanente. However caution must be advised before making concrete conclusions due to the complexity of the matter and until more studies have been conducted. With this thesis an initial step has been taken into a new research field. Ongoing research will make it possible to deliver the evidence needed by decision makers, planners and managers – ultimately to benefit the patients.

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