Horst Albach
Heribert Meffert
Andreas Pinkwart
Ralf Reichwald
Wilfried von Eiff *Editors*

# Boundaryless Hospital

## Rethink and Redefine Health Care Management

Springer

# Boundaryless Hospital

Horst Albach • Heribert Meffert •
Andreas Pinkwart • Ralf Reichwald •
Wilfried von Eiff
Editors

# Boundaryless Hospital

## Rethink and Redefine Health Care Management

Springer

*Editors*
Horst Albach
Center for Advanced Studies in Management
HHL Leipzig Graduate School of Management
Leipzig, Germany

Heribert Meffert
Center for Advanced Studies in Management
HHL Leipzig Graduate School of Management
Leipzig, Germany

Andreas Pinkwart
Center for Advanced Studies in Management
HHL Leipzig Graduate School of Management
Leipzig, Germany

Ralf Reichwald
Center for Advanced Studies in Management
HHL Leipzig Graduate School of Management
Leipzig, Germany

Wilfried von Eiff
Center for Health Care Management and Regulation
HHL Leipzig Graduate School of Management
Leipzig, Germany

ISBN 978-3-662-49010-5 ISBN 978-3-662-49012-9 (eBook)
DOI 10.1007/978-3-662-49012-9

Library of Congress Control Number: 2016930828

Springer Heidelberg New York Dordrecht London


Printed on acid-free paper

Springer-Verlag GmbH Berlin Heidelberg is part of Springer Science+Business Media (www.springer.com)

# Preface

The title of this book is taken from an article which was published in the Australian and New Zealand Journal of Medicine in 1994. The authors J. Braithwaite, R. Vining, and L. Lazarus applied a vision of the organization that Jack Welch, former CEO of General Electric (GE), had developed to make his company successful: *boundarylessness*. In the 1990 Annual Report of GE, Welch projected, "Our dream for the 1990s is a boundaryless company, a company where we knock down the walls that separate us from each other on the inside and from our key constituencies on the outside."

For Jack Welch, boundarylessness was the way to increase productivity. In his CEO letter to GE's shareholders, he wrote one year later, "1991 did, however, once again remind us how absolutely critical productivity growth is in the brutally Darwinian global market places in which virtually all of our businesses compete. [. . .] But to increase productivity, you first have to clear away all the impediments that keep you from its achievement—primarily the management layers, functional boundaries and all the other trappings of bureaucracy."

Welch stressed boundarylessness as an instrument for productivity growth through cost-cutting, which is important in order to survive in highly competitive markets. The hospital is not primarily considered an organization which provides services on competitive markets. Though, the hospital of today, which is a fact, also faces tough cost pressures. However, the goal of hospital management is higher efficiency of health care and good effectiveness. It is the key to achieving the target triangle (quality, access, and affordability) of health care based on a sustainable reimbursement system. The objective of hospital managers is to ensure the provision of high-quality care and healing environment services despite increasing financial constraints.

With the book in hand, the Center for Advanced Studies in Management (CASiM), the interdisciplinary research center of HHL Leipzig Graduate School of Management, aims at addressing this challenge. This requires more than planning and control of a firm. It goes beyond accounting and digitalization. The patient is more than a mere customer. Efficiency management in a hospital is based on both a profound understanding of medicine and nursing on the side of the manager and a deep understanding of business economics and health services on the side of the medical scientist. And for both sides as well as for the regulator, a

deeper understanding of the impact of the regulatory framework on the outcome of the health care system is indispensable. The former traditional boundaries between health professionals, administrators, and nursing staff have to be removed to enable new effective forms of cooperation. The successful hospital of the twenty-first century is a *boundaryless hospital*.

And above all, managing the hospital requires a deeper and holistic understanding of the patient. To achieve this, on the one hand, the experience of the medical and nursing staff should be taken into consideration and recommendations should be monetarized against the background that a significant proportion of the healing success is actually psychology, and on the other hand, the new field of so-called *personalized medicine* should be further developed. Personalized medicine is a vision for health care. There may be similar concepts in other fields, particularly in marketing consumer products, where business economists talk about "markets of one" or "lot size one," but in medicine the concept is different. Our author Manfred Dietel defines personalized medicine as "the intention to diagnose and treat patients more precisely adapted to their individual needs." This new development has its background in modern tendencies: globalization with boundaryless markets, digitalization with boundaryless IT tools, demographic aging, and increasing risk.

All health care systems try to cope with the rising expenditures of health care, but the systems differ from country to country. Insurance—public or private—is one way to finance the costs of health care. Insurances may cover all expenses or they may require the sick persons to pay their health expenditures themselves. Regardless of the particular health care system, Jan P. Beckmann provides in his introductory contribution a philosophical underpinning for our approach to reach more efficiency and better outcomes with new economic instruments.

Boundarylessness in our understanding does not mean that there are no rules. On the contrary: The boundaryless hospital has to work on the basis of codes of conduct and contracts with regard to both internal and external relations. From Hirschhorn and Gilmore, we already know about the importance of internal "boundaries of the boundaryless company," as they called it in the Harvard Business Review in 1992. They argued that the players in a boundaryless company "must figure out what kind of roles they need to play and what kind of relationships they need to maintain in order to use those differences effectively in productive work."

Regarding the external boundaries, Alvin Roth, a 2012 Laureate of the Nobel Memorial Prize in Economic Sciences, gives a striking example of the positive impact of market design on the supply of donor kidneys. In his 2015 book on matchmaking and market design, his explanation of the entire process of establishing a kidney transplant network impressively shows the potential of synergies which can be exploited if the formidable obstacles caused by different logics on different sides can successfully be overcome: "Garet's frustrations led him in late 2007 to form an exchange network he called the National Kidney Registry. It [. . .] aims to facilitate potentially quite long non-simultaneous chains by recruiting hospitals and non-directed donors. If a hospital sends a non-directed donor, the NKR promises to end one of its chains at that hospital. That ensures that

the hospital doesn't "lose" a transplant by sharing its donor: Keep in mind that hospitals earn revenue on their transplants; they're commercial enterprises as well as caregivers."

Cooperation and Big Data are the key words for the new developments in health care. They are the topics of this book. Cooperation in our understanding of a boundaryless hospital does not only refer to scientists from various disciplines and practitioners from different medical branches working together but also to the overall management of the value chain in the health care process and a new form of relationship between the doctor and the patient. As an example, Florian Kron and his coauthors present a new form of organization which provides the medical services cancer patients need—the Comprehensive Cancer Center (CCC): "The CCCs are the forefront to fight cancer. From an organizational perspective these large centers are highly complex. They cannot operate as standalone organizations but rely on cooperation in a network of hospitals and office-based physicians." Big Data means huge databanks with information about individual patients with individual diseases and individual methods for treating those diseases. But it is more than "number crunching" and repository management: Big Data solutions generate decision-relevant information. They aim at improving diagnosis and accelerating start of therapy to increase therapeutic effectiveness and patient outcome.

The papers in this book address international and interdisciplinary aspects. After introductory contributions in Part I, Parts II and III seize the previously identified opportunities across countries and disciplines and analyze whether the new concept is suitable to meet future challenges better. They elaborate and comment on the health care systems of Finland, Germany, Malta, the Netherlands, Portugal, and Switzerland. They deal with different diseases such as cancer, heart diseases, epilepsy, and inflammatory bowel disease, and with chronic care. The new developments also lead to new professions. Maarten Janssen and his coauthors draw attention to the "physician assistant" (PA) in the Netherlands. "Increasing experience, developed routines, specialization and trust among the medical and nursing staff enables PAs to gradually expand their occupational place, highlighting the fluidity of its boundaries." In the final Part IV, the boundaryless hospital is particularly reflected from the patient's perspective. Among other topics, the authors discuss the relevance and importance of patient involvement and its innovative potential for further development of health care.

Each book publication is the result of a considerable collective effort, and the completion of an edited volume always requires additional coordination. We would like to use this opportunity to thank all contributors collectively for their important efforts in realizing this project.

Some contributors we would like to praise individually. Specifically, we thank all authors for their highly stimulating papers and all reviewers for their critical and constructive feedback.

This book project also benefited greatly from fruitful discussions with the members of the board of CASiM. We would like to acknowledge their important support. Special thanks go to Prof. Dr. Thomas Gehrig (University of Vienna,

Austria) and Prof. Dr. Peter Letmathe (RWTH Aachen University, Germany), who also acted as reviewers in the double peer review process.

We would particularly like to thank our partners Siemens AG, B. Braun Melsungen AG, and McKinsey & Company, Inc. Without their expertise and financial support the publication would not have been possible in its current form.

Furthermore, we would like to thank Dr. Martina Bihn, Editorial Director at Springer, for her professional guidance and the constructive discussions throughout the publication process.

Last but not least, we owe special thanks to Daniela Neumann and Dr. Lukasz Swiatczak from the Executive Office of CASiM who managed this book project. They successfully coordinated all activities of the authors, reviewers, and editors and provided continuous editorial support.

We hope this publication will not only provide interesting reading but will also encourage further discussions and academic research on the boundaryless hospital and other innovative approaches to coping with the challenges and opportunities of health care in the twenty-first century.

We welcome your feedback via casim@hhl.de.

Leipzig, Germany
September 2015

Horst Albach
Heribert Meffert
Andreas Pinkwart
Ralf Reichwald
Wilfried von Eiff

# Contents

# Part I

# Challenges and Opportunities of Health Care Management in the Twenty-First Century

# Network Management: Strategic Option for the Boundaryless Hospital

Wilfried von Eiff

**Abstract**

Due to the phenomenon of the aging society, the number of patients suffering from multi-morbidity and/or chronic diseases has rapidly increased. Simultaneously, the cost-intensive progress in medical technologies leading to more precise diagnostic and innovative surgical interventions, enables treating patients with complex illnesses, as well as elderly people, more effectively.

Bearing this development in mind, it is fair to comment that patient-centered, successful medical services based on sustainable financial sources have to be organized in cross-sectoral medical networks consisting of primary care physicians, specialized clinics and rehabilitation facilities. The concept of the *boundaryless hospital*, in combination with the *value chain approach*, provides the theoretical basis for an effective and efficient network design. In this article, the nature, aims and impacts of network management in medicine are described. Furthermore, the traps and pitfalls of insufficient and inefficient network structures are discussed, and different types of network configurations, as well as limiting factors of network design are reflected. In addition, selected network concepts like the portal clinic approach, cross-sectoral contracting, managed care opportunities and emergency network designs are depicted.

**Keywords**

Medical networks • Network management • Strategy • Value chain • Cooperation • Integrated care • Network design

W. von Eiff (✉)
Center for Health Care Management and Regulation, HHL Leipzig Graduate School of Management, Jahnallee 59, 04109 Leipzig, Germany
e-mail: wilfried.von.eiff@hhl.de



H. Albach et al. (eds.), *Boundaryless Hospital*, DOI 10.1007/978-3-662-49012-9_1

## 1 Initial Situation

The highly developed health care systems of the Western countries will generally face similar challenges over the next 5–10 years:

- The phenomenon of the aging society causes a rising number of multi-morbid patients, and age-related diseases will increase.
- In addition, the number of chronic diseases will rise, especially those related to an unhealthy lifestyle (work stress, poor nutrition, lack of activity).
- Medical-technological progress enables more precise diagnoses and innovative intervention techniques, which also makes it possible to treat aged people more effectively.
- It is evident that there is a growing mentality of entitlement among patients regarding the diagnostic and treatment potential of modern medicine.

On the one hand, these trends will undoubtedly contribute to a rising demand for qualified health services. But on the other hand, strict financial limitations narrow the policy option for health care provision. Moreover, ethical questions arise and dominate the discussion surrounding the ethics and fairness of health services distribution and the limits that medical interventions have to respect: "Should we administer any medical service to patients that we basically can?", "Do the economic factors override the medical aspects?" and "Is rationing an appropriate approach for balancing an excess demand for health services and the limitations of financial resources?" These questions will have a central impact on the design of medical service structures in the future. In other words, the increasing demand for state-of-the-art medical services, performed in a healing environment, has to be achieved with limited budgets.

Against this background, it is necessary for a viable structuring of the health care system in future, to find medical supply forms that:

- conform to patients' expectations,
- ensure the fair distribution of effective evidence-based medicine to the community and
- integrate innovative treatment into the health care system in a way that ensures clear benefits and financial viability.

These organizational forms of provision, which focus on therapeutic effectiveness and efficient use of resources, require the goal-driven cooperation of different medical specialists.

Therefore, the economic component, as a design parameter for medical service structures, plays a more and more important role. This is confirmed by the efforts the German government, as well as of the statutory health insurance companies, which invest to steer the quality and service transparency of the hospital in terms of a pay-for-performance system. In connection with a so-called "purchasing system" of the insurance companies and the scrapping of the obligation to contract with

hospitals holding a public supply mandate, it would be possible for the payers to take out individual quality-related (and possibly cost-related) contracts with the hospitals.

As a consequence, the successful organization and management of a hospital requires:

- a patient-centered medical service portfolio, which is strictly oriented to the needs of the health care market,
- offering selected, highly specialized and innovative medical services ("light-house" performance), as well as state-of-the-art care provision for the basic medical needs of the population in a limited catchment area,
- strict orientation of the design of internal processes to patient needs,
- goal-driven and economic cooperation with highly qualified external partners who are capable of contributing to the successful treatment of patients suffering from complex diseases,
- a holistic approach to the diagnosis and treatment of patients along the care continuum and
- ensuring complementary treatments for multi-morbid patients.

In this scenario of supply structure and contract options, it is essential for the hospitals to develop service structures in which qualified medicine is performed at financially sustainable levels. Experiences from the turnaround in the automotive industry in the 1980/1990s show that efficient structures can neither be professionally nor cost-effectively produced on an individual basis, but are characterized by network-oriented cooperation along the value chain. A comparable development can be found in the health economy, characterized by three design elements, which change the strategic role of the hospital and which enable new organization and steering forms for the medical supply of a country. These are the *boundaryless hospital*, the value chain as a factor combination and the network as an expression of decentrally allocated medical expertise.

## 2 The Boundaryless Hospital and the Value Chain in Health Care

The *boundaryless hospital* is patient-oriented, provides a safe environment, the medical knowledge is state-of-the-art and limited resources are used in a goal-oriented (effective) manner and without waste (efficient). Furthermore, the boundaryless hospital overcomes typical negative characteristics of hospitals: multi-bed rooms, lack of privacy and lack of self-control. Therefore, the boundaryless hospital approach incorporates the mission of transforming a typical health care setting into a healing environment that improves patient outcomes and employee motivation through the creative use of evidence-based design (von Eiff 2007).

*Internal boundaries*, caused by a silo mentality between professions and departments, with the consequence of poor communication and process efficiency, are teared down by interdisciplinary delegation, center organization and an incentive system that connects both ethical and economic decision criteria.

To realize *external integration* approaches like telemedicine, cluster strategy, portal clinics, networks for infection prevention, emergency supply and managed care concepts are used. The basis for a structured implementation of these concepts is the value chain approach.

The medical value chain approach refers to the sequence of supply stages for the complete treatment of a disease (e.g. cardiovascular diseases; diabetes) with regard to the individual and personal situation of the patient. The medical value chain is defined independently of institutions.

The hospital value chain (Porter and Teisberg 2006) includes all internal and external resources and institutions which are necessary to treat a disease comprehensively. This value chain approach focuses on the division of labor between medical service providers and aims at the appropriate design of outsourcing, cooperation and networks as supply forms (Fig. 1).

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Infrastructure** | Competence Centers, Community Health Centers, Telemedicine, Portal Clinics, Innovative Technology, Healing Environment | | | | | | | |
| **Knowledge Management** | Surgery Techniques, Innovative Medical Products, Prozess Optimization/Organisation, Good Medical Practice, Guidelines, Patient Datenbase, Bio Database | | | | | | | |
| **Information Management** | Quality Reports, Critical Incident Reporting, Patient Information, Enlightenment and Education, Patient Compliance Programs | | | | | | | |
| **Measuring and Documentation** | Resulty Quality, Process Quality, Patient Record Management | | | | | | | |
| **Access Management** | Incentive Systems, Setting Approach, Screening Program, Disease Management, Case Management, Hospitalist, Homecare Management | | | | | | | |
| **Phases of value added** | **Lifestyle Prevention** | **Monitoring Prevention** | **Central Emergency Department** | **Diagnosis** | **Therapeutic Intervention** | **Recovery Rehabilitation** | **Health Care Support** | **Nursing Home Management** |
| **Tasks** | • Health supporting lifestyle and environment<br>• Impact of risk factors<br>• Family anamnesis | • Screening<br>• Targeted prevention programs<br>• Risk factors<br>• Genetic predisposition<br>• Causes of death | • Triage and qualified initial treatment<br>• Patient control<br>• Bed occupancy management<br>• MRSA-Screening<br>• SOP<br>- Manchester<br>- Wells<br>- Hamm<br>• Discharge functional diagnostic, ICU, wards | • Admission diagnosis<br>• Anamnesis<br>• Tests<br>• Functional diagnois<br>• Specialis consultation<br>• Treatment plan | • Procedures<br>• Medication<br>• Discharge diagnosis<br>• Rehabilitation plan<br>• Treatment plan | • Early rehabilitation<br>• Therapy adjustment<br>• Rehabilitation<br>• Follow-up plan | • Monitoring and influence of patient's condition<br>• Influencing patienten compliance<br>• Monitoring of changes in lifestyle | |
| **Benefits** | Delay<br>• Entry into the system<br>• Severity level | Risk detection and preventive therapy | Clinical and economic control of patients | Precision, liformation value | Clinical effective/ Outcome-oriented | Recovery social/occupational mobility | Support and control | High quality of life in old age |

Value Chain

Advantage

Patient's Benefit

Outcome

Medical Result

Process Costs

**Fig. 1** The health care value chain

## 3 Networks in Medicine and the Health Business: Rational Network Design

Networks in medicine constitute a specific organizational type for providing a population or group of patients with health care services. The added value of networks, in comparison to individual (centralized) forms of supply organization results from the following medical and economic aspects:

- Networks are virtual knowledge centers. They mobilize and distribute expert knowledge and make it broadly available.
- Networks create near-to-patient services by dividing up specialized tasks and continuous medical care duties in a capability- and demand-oriented manner.
- Networks enable resource sharing and ensure secure investments and utilization efficiency.

The benefit of networking between medical service providers in the health care system is not only motivated by a desire to improve quality or to optimize resources, but is also fostered considerably by the German legislator. Social Security Code regulations §§ 39, 112, 140 a-f and 301 SGB V (Sozialgesetzbuch V 2015) indicate that a medically efficient and cost-effective cooperation along the value chain (in the sense of the patient care process from initial treatment until the completion of follow-up treatment) is supported by networks.

The aim of networks is to

- increase patient/customer satisfaction (Nagyrapolt 2008);
- improve patient's well-being (patient outcome);
- decrease costs per case;
- optimize the patient's pathway through the entire health care system in a case-oriented manner, meaning shortening the process and simultaneously performing it at lower cost;
- increase the quality of medical and social care of patients (and relatives) by mobilizing the best medical know-how, as well as nursing and physiotherapeutic capabilities;
- improve image so as to develop a brand status.

Given these aspects, a network can be seen as a target-oriented organized form of cooperation with the aim of meeting the requirements of the health care market in a customized, medically sound and cheaper manner (Fottler and Malvey 1995).

Networks serve to

- close identified supply gaps in a customer-oriented manner. The underlying reason is that the expert knowledge which is available in one's own organization is normally not sufficient to fully meet the market requirements (case requirements) or to set a new standard in the market.

- decrease the costs of preparation and distribution of a product/service, so that, e.g. one's own cost structure is disburdened by cooperating with the cost leader, or so that a higher medical supply level can be achieved by cooperating with the quality leader.
- open up new fields of business (added-business variant), which is not possible for a single hospital, because of a lack of market access or because the necessary expertise is not (yet) available to the required extent.
- mobilize know-how that is not available in one's own hospital or which has not yet been established for economic reasons (insufficient utilization of highly specialized and expensive capacities).

Furthermore, networks in health care, with their holistic patient-care approach, are the basis for a regional supply concept. However, they also serve the purpose of improving the quality of medical service processes and of simultaneously containing costs. Such organizational linkages affect medical processes (e.g. disease management programs) and complement supply processes (e.g. supply of medical products, radiology services or catering services).

For a hospital network, connections are possible or useful in three phases:

- Connections to general practitioners, e.g. by joint investments in high-tech medical devices with the aim that the general practitioner preferably refers patients to the partner hospital.
- Connections to support service processes in the hospital; this can affect para-medical professions (physiotherapist, speech therapist, etc.) as well as secondary service providers (radiology) and tertiary service providers (logistics).
- Connections to follow-up institutions, to generate a consistent treatment of patients on the basis of standardized coordinated therapy and rehabilitation approaches (aim: consistent quality assurance on the basis of proven guidelines and evidence-based medicine).

However, these networks can only work effectively, if

- the organizational structures and service processes of the network partners are coordinated according to the value chain approach (principle of corresponding organizations);
- common interests are present or can be achieved;
- the service provision, reimbursement and cost structures are transparent according to an open-book mentality;
- the partners act in the spirit of agreement in exceptional situations;
- a commonly accepted incentive system, which automatically reaches a uniform level of care provision of the partners and which has a process-coordinating effect, is the basis for cooperation.

Depending on aims, intentions, organizational and market-oriented frameworks, networks can be designed differently (Epstein and Harris 1995). These design alternatives are developed according to the following criteria:

- object/area of agreement (definable business field, definable operative task or the entire company, or a complex strategic task);
- temporary or unlimited agreement;
- core business-orientation or concerning the tertiary area;
- retaining or giving up legal or economic autonomy;
- level of organizational integration of the reporting system, level of decentralization, nature of incentive system, number of decision-making levels, influences on decisions, etc.

## 4 Restrictions of an Effective Network Design

There are four main obstacles in health economic practice which impede the development of effective network structures:

- Silo mentality within departments and between professions, including the associated inadequate communication. This refers especially to the demarcation of tasks, competencies and responsibilities between nurses and physicians, as well as the delegation of doctor's services to nurses.
- Incentive systems which favor hospital boundaries. This affects, e.g. economically motivated goals, which induce leading physicians to treat patients themselves, instead of referring them to qualified specialists.
- Sectoral financial budgets impede payment to qualified outpatient services performed by hospitals in the case of particularly serious diseases.
- Cross-sectoral contracts intended to secure the medical supplies are carried out by different institutions with their own objectives. In consequence, hospital planning and that of medical practices (general practitioners) are not coordinated; inpatient and outpatient sectors are not interlinked.

## 5 Types of Networks and Their Purposes

Oriented around the characteristics of a *boundaryless hospital*, networks are characterized by:

- their unique form of cooperation,
- the use of special technology,
- concentration on selected treatment process,
- the integration of both similar and different actors,
- strategic intent.

**Intramural networks** are formed within a hospital with the aim of meeting the special requirements of different patient types/diseases which do not occur regularly. Such a function is fulfilled by, e.g. rapid response teams which consist of different professions from different departments (trauma surgery, anesthesia,

emergency medicine) in order to treat patients with life-threatening conditions, as well as uncertain diagnoses. The cross-departmental and interdisciplinary organization of internal innovation networks, with the aim of developing more effective and efficient diagnosis methods and therapy approaches (translational medicine), as well as the establishment of tumor conferences, are typical examples of intramural network structures.

**Horizontal networks** integrate medical service providers from the same supply sector (same stage in the value-added process), e.g. with the aim of designing the medical service portfolio according to market requirements and economically, so as to meet quality requirements or to share expensive resources. The mutual allocation of patients on the basis of a specialization strategy is also typical of horizontal cooperation. A significant motivation includes the mobilization of horizontal synergy effects like:

- Cost reduction through merging organizational units, whose services are needed in two or more hospitals, but can be performed regardless of location (laboratory, pharmacy, reprocessing of medical products, kitchen, laundry);
- achievement of procurement advantages through bundling of demand;
- coordination of medical service structures to avoid duplicated provision of resources (e.g. devices for radiology: MRI, PET/CT) or to fulfil minimum quantities for particular interventions (e.g. merging two orthopedic departments to reach the minimum quantity of 50 hip replacements, according to the expert associations and payers' requirements).

**Vertical networks** pursue service integration along the value chain. Typical network aims include market development by binding the referral physicians, e.g. by follow-up cooperation, consistent treatment of complex diseases (diabetes, multiple sclerosis, oncological entities) on the basis of organized patient pathways, as well as guidelines and a cross-sectoral approach of standardized treatment cases with an elective character (e.g. integrated process for total hip replacement patients). Vertical networks also arise through forward integration, for instance, if a hospital with a large orthopedic department (more than 1000 hip treatments per year) takes over an orthopedic rehabilitation clinic, or through backward integration, e.g. if a portal clinic (referral clinic) or a community health center is taken over.

The forward integration creates markets for the takeover target (the hospital secures the utilization of the target's rehabilitation clinic), the backward integration aims to secure referral markets for the hospital.

**Lateral networks** consist of actors from different supply sectors, those with different responsibilities (e.g. financing medical services) and actors from the medical industry. This network type includes managed care networks and legal constructs which connect the financing function (insurance companies) with the service provider function (hospital). Also, exclusive supplier partnerships in the procurement area of a hospital (single sourcing), as well as public-private-partnership projects are included in this type of networks.

**Hybrid networks** are a special kind of lateral networks. They are present if an integration of several lateral partners takes place: For example, an industrial (non-hospital) company takes over a hospital chain, which exclusively uses the products of this particular company (intention: securing markets and innovations). Simultaneously, there are exclusive supplier partnerships with a low number of technology suppliers, which at the same time assume operator responsibility (risk sharing). Additionally, a cross-sectoral, regionally concentrated (cluster) medical service portfolio guarantees a consistent treatment of patients or particular diseases (on the role of the industry in medical networks see Burns and Danzon 2002).

## 6 Factors Constraining Network Design

Limiting factors determine the supply character of networks, they constrain the organization options and define the success factors for operating the network.

The most important limiting factors are:

- The *time*, available between the triggering event (e.g. an acute life-threatening disease) and the therapeutic countermeasure (e.g. lysis to treat a stroke);
- *resources*, which are normally short term and/or expensive like expert knowledge for second opinions, special technology (PET-CT), etc.;
- *room* in terms of the size of the catchment area;
- *population density* (occupational intensity);
- *population structure* (age distribution, as well as prevalence and incidence of diseases);
- *complexity* of a disease or of a treatment case or treatment form (chronic diseases, oncological entities, orphan diseases, refractory wounds);
- *costs* and cost-containment potential;
- *efficiency and earnings potential*;
- *quality* and quality improvement potential;
- *service-supply level* of the population in a region.

## 7 Forms of Organization

### 7.1 King-Pin and Resident Principle

The *King-Pin Principle* of network design is used if a leading hospital provides combined conventional and special services for the other network partners (hospitals, general practitioners, rehabilitation clinics).

These services may entail expensive technical resources (e.g. cardiological interventional diagnostics and therapy), which are provided by the leading hospital and from case to case for the network partners. Knowledge services (second opinion) or diagnostic services (teleradiology) are also possible.

The leading hospital (king) is a service provider and investments by the leading hospital are co-financed by the net partners (pins).

The *Resident Principle* goes beyond the King-Pin Principle insofar as it has its own residents, in other words specialists, on-site in the pin hospital, organizationally integrated, who have access to the resources of the king hospital at any time. The Resident-Principle is often used to build up decentralized know-how in the pin hospitals or these positions are parts of a job rotation system for personnel development.

Both principles are, e.g. used in medical technical service centers. Any expensive test equipment and calibration stations are provided centrally. The repair sets can be found on-site. Resident technicians look after the medical devices on-site in heart surgery operation rooms, ICUs, diagnostic functional areas, with the aim of ensuring a high level of availability of the devices.

### 7.2 C + C Model

The C + C-Model (cooperation and coordination model) represents a designing principle for oncological networks that differentiates between coordinating and cooperating hospitals or general practitioners. To differentiate the tasks between cooperating and coordinating network partners, the C + C Model uses three criteria:

- the range of experts, which refers to the number of participating service providers of different complimentary specialist disciplines,
- the depth of specialization (with regard to oncological entities) and
- the separation of specialized tasks, which are performed in the acute inpatient area (e.g. tumor surgery, proton therapy, radiation therapy) and routine tasks which are performed close to the patient and due to guidelines in the outpatient sector (e.g. chemotherapy).

## 8 Selected Examples of Network Cooperation

### 8.1 The Portal Clinic as an Element of a Referral Physicians Network

Portal clinics (Münch and Scheytt 2014) are of particular importance for providing a comprehensive supply of medical services (also for highly specialized ones): Such clinics are highly qualified primary/secondary institutions for health services, which provide precise diagnoses in order to decide whether or not a patient needs a specialized treatment. They are associated with specialized clinics (e.g. pulmonary/thorax surgery; neurology; etc.), qualified service providers (e.g. radiology centers) and maximum providers by a telemedical IT infrastructure. Patient records are documented and distributed electronically. This enables fast and precise diagnoses, second opinion consultations via conference calls and targeted acute care (Fig. 2). Portal clinics are also of particular importance in emergency care. They give first aid in trauma networks with telemedical connections to maximum care providers.

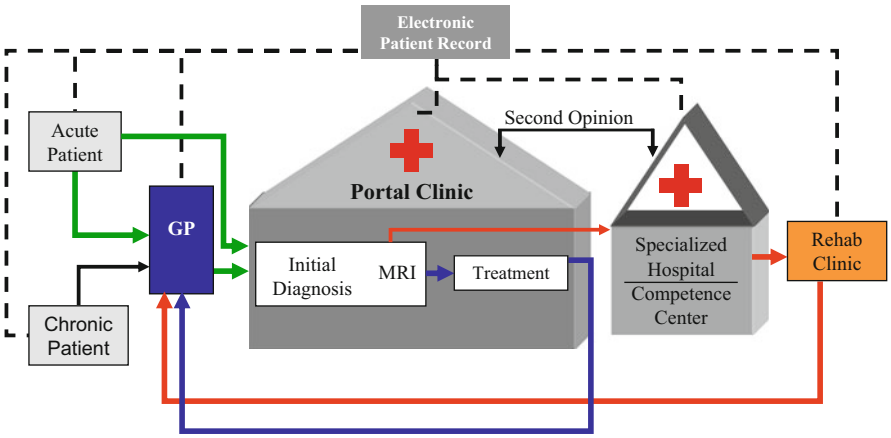


**Fig. 2** The portal clinic is a decentralized hospital for basic medical supply and has the function of a gatekeeper

## 8.2 Integrated Cross-Sectoral Supply Models as a Strategic Option

Cross-sectoral supply models (Preusker 2015) reflect a strategy of bundling the entire medical service portfolio, which is necessary to treat a disease cross-sectorally and comprehensively, subject to uniform control at a single site or in a single region. These are diseases which on the one hand have an elective character and for which the treatment process can easily be standardized (e.g. total endoprosthesis). On the other hand, these medical provision concepts enable new forms of care for treating multi-morbid patients or those with complexity levels which require intensive medical care in the acute and rehabilitation sector (e.g. stroke treatment, cardio-surgical patients, transplantations).

### 8.2.1 Contracts of Integrated Care

Primary care by family practitioners or specialist physicians, diagnosis and treatment in acute care, rehabilitation and outpatient follow-up are cross-sectorally integrated and allocated to a central case management, which leads to shortened stays in the system, with a simultaneous decrease in treatment costs.

Such care is the basic idea behind integrated care contracts (Fig. 3). Diagnosis, therapy and rehabilitation are integrated and achieved without unnecessary waiting times. Follow-up home services enable an earlier discharge.

### 8.2.2 The Integrated Care Net: Supply with Managed Care Character

The integrated supply net connects medical service providers of different specializations with the aim of treating diseases without high complexity levels, so as to provide appropriate care and treatment at comparably low cost.

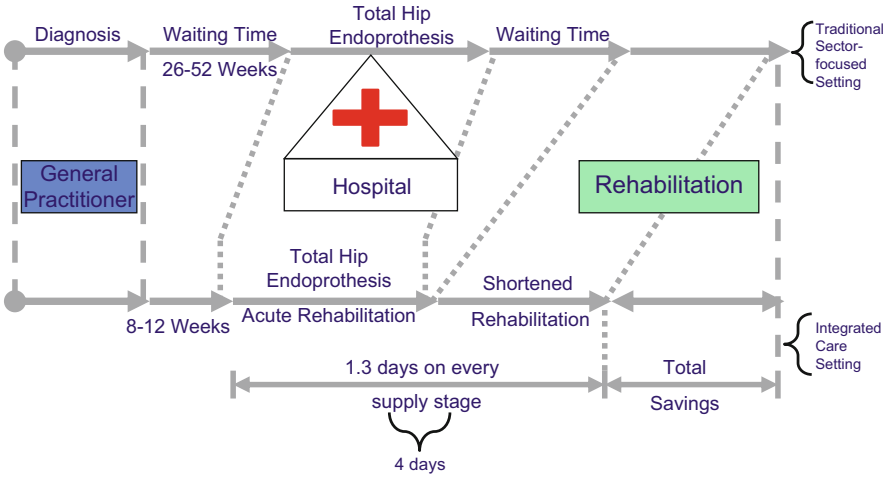


**Fig. 3** Integrated care provision process flow using the example of hip endoprosthesis

On the one hand such network structures connect medical service providers at different supply stages (family practitioner, hospital, rehabilitation clinic, nursing home, etc.). On the other hand the medical service portfolio of such networks is the basis for insurance services, which can be obtained at particularly favorable conditions (Herzlinger 1997). Accordingly, the insurance service can be offered together with the medical service from a single source (in a single-contract package = managed care principle). Telemedical services are increasingly integrated into such managed care concepts (Kaufmann 2014) (Fig. 4).

## 8.3 Networks in Emergency Care

Emergency care is more efficient and effective when there is a smooth and quick link between the medical sectors (outpatient first aid, treatment in the ambulance, complementary inpatient treatment, acute rehabilitation and outpatient emergency follow-up). This can be demonstrated by the example of stroke treatment.

Annually, 250,000 people in Germany are affected by a first or repeated stroke event. 20–30 % of the patients die within the first 4 weeks. In 2013, 18,883 people died because of a stroke (women: 12,078; men: 6805; Statistisches Bundesamt 2014) and it is the second leading cause of death in the world (Müller 2013). The number of patients suffering from this acute disease is increasing, because of the aging society. Strokes occur especially at an advanced age. Men are aged 70 on average when suffering from the first stroke and women about 75. The World Health Organization (WHO) labels strokes as the “upcoming epidemic of the twenty-first century”.

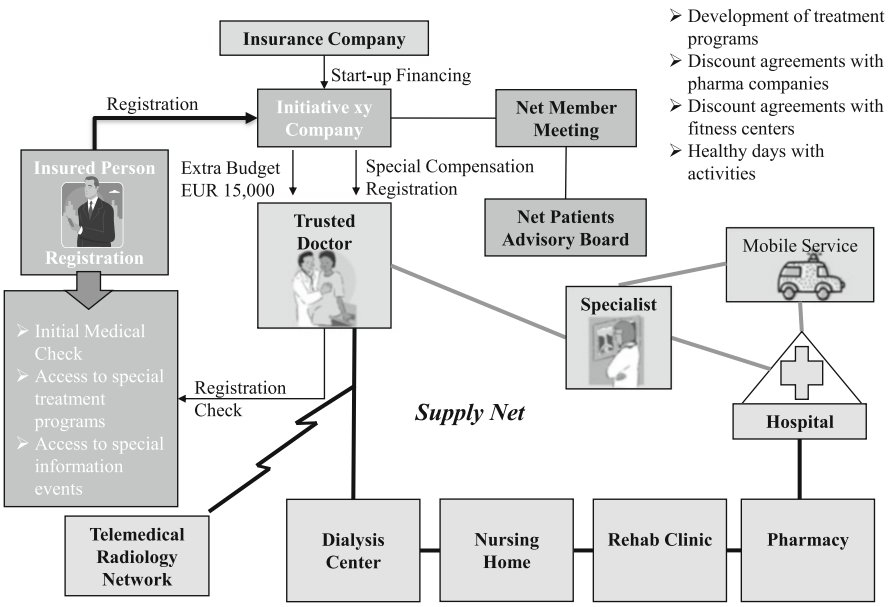


**Fig. 4** Medical supply networks with a managed care character

In the case of a stroke, rapid emergency care is needed. Two rules reveal complementary and economic effects:

- *Time is brain*: The faster the stroke is treated, the larger the range of effective diagnostic and treatment options and the more positive the prediction regarding a return to a normal and largely self-determined life. One third of the patients remain permanently in need of care, which could partly be avoided by more rapid specialist care.
- *Time is money*: Rapid treatment enabled by integrated diagnostic and treatment approaches decreases individual treatment costs.

It is important that the key actors in the stroke value-added process match and perform their medical services promptly according to the guidelines (Figs. 5 and 6).

To do so, it is necessary to:

- train the rescue teams (emergency doctors, ambulance staff), to recognize stroke symptoms fast and clearly,
- concentrate the transport route on a hospital with stroke competencies,
- obtain the initial diagnosis in hospital (by CT/perfusions-CT/MRI) immediately after admission,
- have the therapeutic team (neurology, stroke nurse, physiotherapist, speech therapist) immediately available and
- ensure the immediate start of rehabilitation (no more than 6 h after the stroke event).

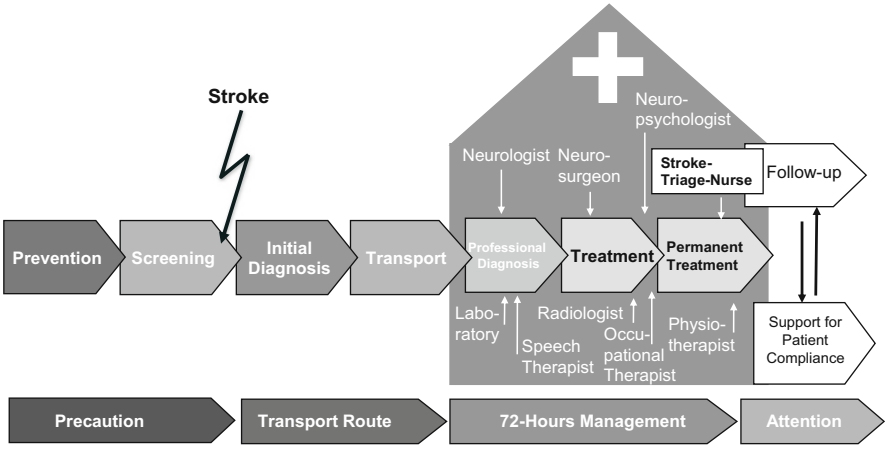


**Fig. 5** Treatment according to the stroke management process

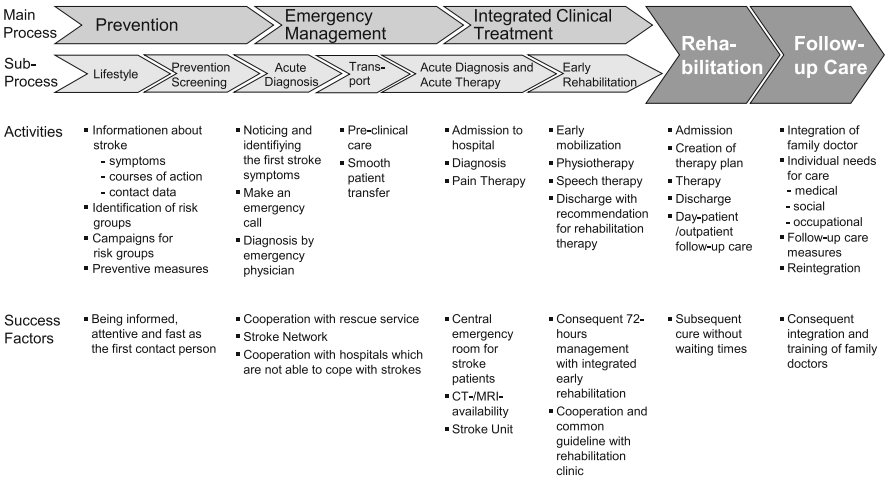


**Fig. 6** Stroke management before and after admission to a hospital

## 8.4 Medical Clusters

Clusters (Porter 2008; von Eiff 2012) are regional (local) concentrated aggregations of medical service providers at different vertical stages in the value chain (Preusker 2015). They enable economies of scale by centralizing tertiary services (catering, cleaning, laundry, procurement, logistics, administration), through economies of scope by means of special offers (care concepts, assisted living, dementia care, Parkinson's disease care) an by economies of management (negotiations with payers from a single source for integrated services along the entire value chain) (Fig. 7).

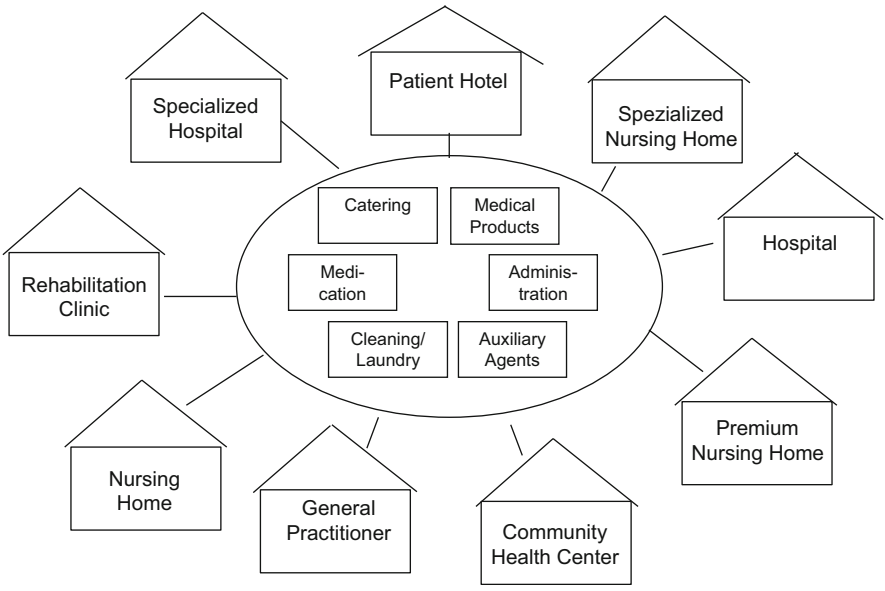


**Fig. 7** Clusters facilitate economies of scale through regional centralization of tertiary services and economies of scope by additional social services (based on von Eiff 2013)

## 8.5 The Campus Concept

A campus is a local concentrated association of complementary medical service providers, with the aim of ensuring complete and comprehensive care for complex diseases (e.g. orphan diseases, cancer, cardiovascular diseases) (Fig. 8).

The campus concept facilitates interdisciplinary medicine, which is designed to provide complementary service structures for patients with complex diseases, multi-morbidity and special treatment requirements. The campus concept enables specialization and complementary differentiation of a medical service portfolio in acute care, as well as in elective care, with the aim of providing complete and full treatment (life cycle of care). The campus medical treatment approach is oriented towards the causal connections of diseases: 35 % of all heart attack patients are simultaneously diabetics and 20 % of all cardiovascular patients suffer from strokes. Diabetics are affected more than average by vascular complaints (diabetic foot; vascular stenosis). The campus concept brings together cardiology, cardiothoracic surgery, vascular surgery, diabetology, rheumatology and neurology. At the same time, the campus concept is cross-sector oriented: Outpatient services are offered, as well as acute care, rehabilitation and nursing services. Finally, the campus is a location for interdisciplinary medical research.

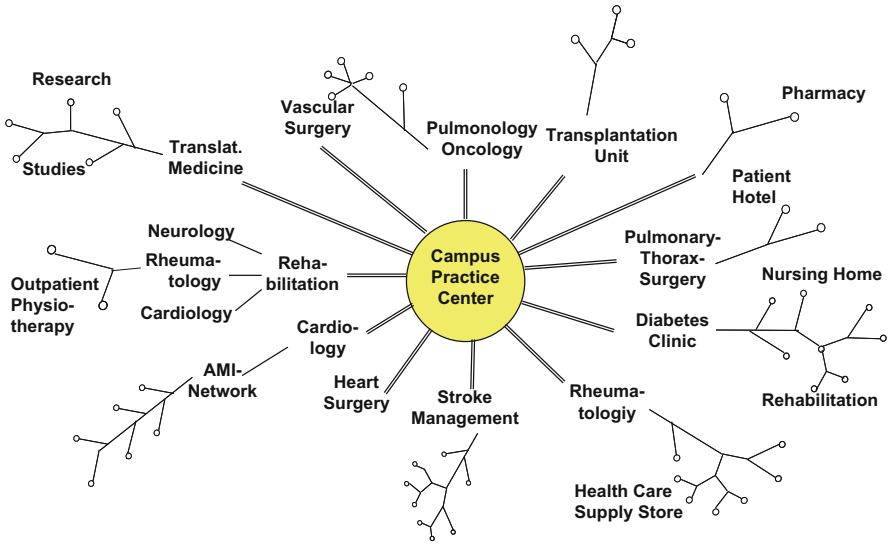


**Fig. 8** The campus practice center

## 9 Conclusion

Networks in medicine are a powerful form of organization for meeting the challenges of the aging society, medical and technological progress, as well as the increasing number of more both medically and behaviorally demanding patients. Networks are the *organization of choice*, if complex illnesses are to be treated effectively. Rapid reaction to emergency situations is required and the competitive position of a hospital should generally be improved. Networks for the treatment of complex illnesses, such as in oncology, combine special services offered by maximum provider institutions (e.g. teaching hospitals) with routine services (e.g. transarterial chemoembolization) given at decentralized primary care physicians' offices. Within this type of network, distributed knowledge is the basis of design.

The critical success factor for designing an emergency network is time. In order to ensure that patients with life-threatening conditions get to the right hospital fast enough, the rescue chain has to orchestrate pre-clinical and acute care activities.

Furthermore, networks can be built and steered by *financial incentives*. Such *managed care networks* give patients the choice between different insurance options in combination with the option to request treatment only by selected physicians under contract with a health maintenance organization.

Networks contribute toward enhancing medical quality for the broader population and specific patient groups and toward simultaneously containing costs in the health system. In networks, duplicated diagnostic work can be avoided and purchasing advantages mobilized by bundling the demand for medical products. However, networks may also suffer from limiting factors of design such as aspects related to resources, catchment area, illness complexity and age structure of the population. The efficiency and effectiveness of networks depend on the level of commitment of the network and on the nature of partner behavior. It is a fact that low-commitment networks tend to foster "maverick behavior".

## References


Burns LR, Danzon PM (2002) Pharmaceutical manufacturers. In: Burns LR, Wharton School Colleagues (eds) The health care value chain. Producers, purchasers and providers. Wiley, San Francisco, pp 219–249

Epstein JD, Harris SF (1995) Legal structure of health care delivery system. In: Wolper LF (ed) Health care administration. Principles, practices, structure and delivery, 2nd edn. Johns & Bartlett Learning, Gaithersburg, pp 589–599

Fottler MD, Malvey D (1995) Multiprovider systems. In: Wolper LF (ed) Health care administration. Principles, practices, structure and delivery, 2nd edn. Johns & Bartlett Learning, Gaithersburg, pp 489–515

Herzlinger R (1997) Market driven health care. Who wins, who loses in the transplantation of America's largest service industry. Perseus Books, New York

Kaufmann S (2014) Herausforderungen des Versorgungsmanagements aus Sicht einer Schweizer Gesundheitskasse. In: Fink U, Kücking M, Walzik E, Zerth J (eds) Solidarität und Effizienz im Gesundheitswesen. Ein Suchprozess. medhochzwei Verlag, Heidelberg, pp 261–268

Müller T (2013) Jeder Zehnte stirbt an Schlaganfall. In: ÄrzteZeitung online, 29.10.2013. http://www.aerztezeitung.de/medizin/krankheiten/herzkreislauf/schlaganfall/article/848989/welt-schlaganfall-tag-jeder-zehnte-stirbt-schlaganfall.html. Accessed 17 Sept 2015

Münch E, Scheytt S (2014) Netzwerkmedizin. Ein unternehmerisches Konzept für die altersdominierte Gesundheitsversorgung. Springer Gabler, Wiesbaden

Nagyrapolt ASG (2008) Value adding service delivery strategies. In: Ginter PM, Swayne LE, Duncan WJ (eds) Strategic management of health care organizations, 6th edn. Wiley, Chichester, pp 293–333

Porter ME (2008) On competition. Harvard Review Press, Boston, 2nd revised edition

Porter ME, Teisberg EO (2006) Redefining health care. Creating value-based competition on results. Harvard Business School Press, Boston

Preusker U (2015) Das deutsche Gesundheitssystem verstehen. Strukturen und Funktionen im Wandel. 2. Auflage. medhochzwei Verlag, Heidelberg

Sozialgesetzbuch V (2015) Sozialgesetzbuch (SGB) Fünftes Buch (V). http://www.gesetze-im-internet.de/bundesrecht/sgb_5/gesamt.pdf. Accessed 17 Sept 2015

Statistisches Bundesamt (2014) Gesundheit. Todesursachen in Deutschland 2013. https://www.destatis.de/DE/Publikationen/Thematisch/Gesundheit/Todesursachen/Todesursachen2120400-137004.pdf?__blob=publicationFile. Accessed 17 Sept 2015

von Eiff MC (2007) The healing environment. Eur Hosp 16(5):46

von Eiff W (2012) Wettbewerbsstrategie. Bedeutung des Porter-Ansatzes für Kliniken. Health Care Manag 3(5):14–17

von Eiff CA (2013) Mergers & Acquisitions auf dem deutschen Gesundheitsmarkt. Eine wirtschaftliche und rechtliche Betrachtung von M&A + Transaktionen im Krankenhaussektor. medhochzwei Verlag, Heidelberg, p 38

**Wilfried von Eiff** is Professor of Health Care Management at HHL Leipzig Graduate School of Management and is the Director of the Center for Hospital Management, a research institute linked to the University of Münster, Germany. Both institutions are well-known for international and national research, consulting and government advisory activities in the fields of cost–benefit analysis of medical technology and clinical procedures, strategic management and mergers and acquisitions in the health care sector, business ethics in medicine, risk management and health service research. Prof. von Eiff is a founding member of the initiative 'Best Practice Management in Healthcare and Hospital Management', which is part of the European Hospital Management Association (EHMA). He is member of various boards of directors in health care and industry. Before, he was Director and Member of the Board of the University Clinic of Giessen, Germany, and also Managing Director of an international automotive company overseeing the fields of organization, process, logistics and IT management. He holds a doctoral degree from the Faculty of Business Administration, University of Tübingen, Germany, as well as a doctoral degree from the Faculty of Medicine, University of Giessen.