



1 Introduction

Assuring a nationwide and conveniently located medical care for the population is one of the central concerns of the health policy. Yet, even though Germany provides a very well developed system of outpatient and in-patient care overall with a partially high concentration and good accessibility, substantial problems in its' allocation can be recognised (cf. SVR, 2014, p. 349). On the one hand, they refer to the spatial differences of patient care capacities, which are to be found primarily between rural and urban regions — and particularly in the new federal states (cf. BMG, 2016). On the other hand, there are the deficits in the balance of ratio between different medical specialities (cf. SVR, 2014, p. 400).

1.1 Problem statement

As intended by the legislator, requirement planning is to be carried out on the basis of the guideline for requirement planning of the Joint Federal Committee to avoid patient care deficits and over-treatment in outpatient section (cf. BMG, 2016). Concerning this matter, the §99 – 105 SGB V obligates the National Association of Statutory Health Insurance Physicians to carry out requirement planning and to make a requirement plan in agreement with the National Associations of Statutory Health Insurance Funds and continuously adapt it according to the regional requirement (cf. SIMON, 2013, p. 271).

An important criterion for the evaluation of need-based patient care is the patient care rate on this background (cf. GKV-SPITZENVERBAND, 2014, p. 4). Hereby, a patient care rate¹ of 100 v.H. means that exactly as many doctors are authorised as required (cf. GKV-SPITZENVERBAND, 2016). In this context, over-treatment means a patient care rate greater than 110%. On the other hand, under-treatment means the patient care rate is under 75%.

Yet, despite a guideline and indicator-based regulation of patient care, substantial unequal distributions in the density of patient care have emerged in Germany (cf. SVR, 2014, p. 353). Along with regions with imminent or already existing under-treatment in the outpatient sector, there are regions with considerable over-treatment. Particularly in rural and underdeveloped regions, the general physician patient care is vulnerable. The median patient care rate of general physician patient care for entire Germany is 108.6%, whereby almost two-thirds

¹ Patient care rate = General ratio x actual number of doctors x 100 / actual number of residents



of the planning area shows a patient care rate of under 100% (cf. SVR, 2014, p. 358). The lowest patient care rates are to be found in Saxony-Anhalt, Mecklenburg-Western Pomerania and Brandenburg, the highest in Berlin, Bavaria, Hamburg and Schleswig-Holstein. They manoeuvre the medium patient care rate for entire Germany (cf. SVR, 2014, p. 360).

However, the number of internists practicing in conurbations is much more than planned by the requirement planning (cf. SVR, 2014, p. 353). In 2009, the patient care rate here was mostly 110% to 150% as per speciality (cf. WALENDZIK et. al, 2013, p. 319). Accordingly, there was mainly over-treatment as per the guideline for requirement planning. As an example for the specialist internists section, the patient care rate was actually between 167.9% (Saxony planning area) and 301.6% (Bremen planning area) as per the report of the Advisory Council on the Assessment of Developments in the Health Care System 2013 (cf. SVR, 2014, p. 363). The deficiency: The representation of numbers does not consider the area of focus e.g. oncologists, cardiologists, etc.

On 1 January 2012, as a reaction to the increase in regional imbalance in the contractual and/or outpatient care, the legislator put in place the Statutory Health Insurance Treatment Structure Improvement Act (GKV-VStG). The goal was to improve outpatients' distribution, especially in favour of rural, underdeveloped regions (cf. SVR, 2014, p. 353). Based on the changed legal situation, an adjustment and further development of the guideline for requirement planning was required, which became effective on 1 January 2013 (cf. KLOSE/REHBEIN, 2015, p. 12). First, all groups of doctors were included in the requirement planning. They were differentiated on four patient care levels and allocated in different, large planning areas: general physician patient care (VE I), general speciality patient care (VE II), specialist patient care (VE III) and the separate specialised patient care (VE IV) (cf. SVR, 2014, p. 353). The deficiency of the guideline for requirement planning: the determination of density of doctors does not consider the changed age structure and the increase in chronic diseases, which significantly co-determines the medical requirement (cf. ETGETON, 2015, p. 2). On 23 July 2015, The legislator countered that by bringing the Care Provision Strengthening Act (GKV-VSG) into force. The reformed guideline for requirement planning according to the act came into force on 06 January 2016. It considers, as required by the legislator, regional features overlooking demography, morbidity, socio-economical and spatial factors as well as infrastructural characteristics within the scope of §99 para 1 SGB V, to align the planning closely to the actual requirement for patient care (cf. SVR, 2014, p. 353; cf. BMG, 2016). For this purpose, the SVR recommends the Associations of Statutory Health Insur-



ance Physicians in its report for ensuring the regional patient care in all districts and specialist group, to use its instruments not only as an appeal in case of under-treatment, but also to apply them for targeted reduction of over-treatment (cf. SVR, 2014, p. 353).

As opposed to outpatient care, the responsibility for planning patient care capacities in the hospital area lies directly with the federal states (cf. SIMON, 2013, p. 398). The §6 para 1 KHG obligates them for it. However, the states do not have to maintain the hospitals themselves, but they must ensure patient care of the population as needed with efficient, independently running hospitals by location, specialities, number of beds as well as functional units (cf. SVR, 2014, p. 420; cf. NDS. MINISTRY FOR SOCIAL AFFAIRS, HEALTH AND EQUALITY, without date). According to the judgment dated 16 June 1994 of the Federal Administrative Court (BVerwG 3 C 12.93), the hospital planning has to consider the actual and not the average or rather the preferable requirement (cf. THOMAS et. al, 2013, p. 229). Accordingly, the hospital plans are made based on actual usage data and adjusted and/or updated more frequently without the consideration of a predicted medical care requirement, but very much with the help of demographic prognostic data (cf. *ibid.*). Contrary to this (semi-)government regulation, there are differences in the situation of in-patient care within Germany (cf. SVR, 2014, p. 410); and that in spite of a considerable reduction in capacity (cf. SVR, 2014, p. 408). Thus, from 1991 to 2012 the number of hospitals was reduced from 2011 to 2017. That is equivalent to a 16% reduction ($n = 394$) (cf. *ibid.*). Likewise, the number of full-time employees that consisted of medical and non-medical service reduced, from 1991 to 2012 from 875,816 by approx. 4% to 837,745 (cf. DESTATIS, 2014, p. 11). Whereby, a peculiarity can be identified here: The number of full-time employees in the medical service increased in the same time period from 95,208 by a little over 50% ($n = 47,666$), whereas the number of non-medical personnel declined from 780,608 by almost 11% ($n = 85,736$) to 694,872 (cf. *ibid.*). Likewise, the number of beds set up was reduced between 1991 and 2012. It declined from 665,565 to 501,475, which is equivalent to a reduction by approx. 25% ($n = 164,090$) (cf. DESTATIS, 2014, p. 10). Nevertheless, the number of beds in Germany ranks very high in international comparison with the 27 member states of the European Union. In 2012, Germany had the highest bed density by far (cf. SVR, 2014, p. 409). If one considers the national comparison between individual federal states, then Bremen with 788 beds has the highest bed density before Thuringia (746 beds) and Saxony-Anhalt (cf. SVR, 2014, p. 410). Baden-Württemberg and Lower Saxony has the lowest bed density with 538 and/or 541 beds respectively (cf. *ibid.*).



A nationwide patient care of the population is however not possible only with a sufficient number of beds, it is achieved especially by accessibility to hospitals (cf. SVR, 2014, p. 411). 97.5% of the German population can reach the nearest hospital in less than 20 minutes by car and thus 2.5% require more than 20 minutes (cf. THOMAS et. al, 2013, p. 231). Concerning this matter, particularly the federal states Mecklenburg-Western Pomerania, Brandenburg, Saxony-Anhalt and Thuringia show a rather low density of hospitals and thereby a particular challenge for a nationwide patient care. On the contrary, North Rhine-Westphalia, Hesse, Saarland and the city states demonstrate a particularly high density of hospitals (cf. SVR, 2014, p. 411).

CONCLUSION:

Finally, the main goal of a patient and/or user-oriented health care system must be the establishment and securing of patient care on offer as needed, which is available and accessible in the best way possible for the population (cf. SVR, 2014, p. 603). Therefore, it is established based on the data used that the measures hitherto taken in the outpatient care cannot stop the increasing and incorrect distribution of capacities with concentration on conurbations and thinning out in rural areas (SVR, 2014, p. 604). However, adjustment of regional over and under-treatment is also sought in in-patient care as per the findings presented.

1.2 Objective of the thesis

The development and promotion of health and disease gains additional dimensions through the inclusion of social determinants and/ or the living and working conditions, which are the subject matter of the DAHLGREN-WHITEHEAD-model (cf. KLEMPERER, 2014, p. 23). As per this model, social determinants of health are the conditions, in which the people are born, grow up, live and age. The living and working conditions include the work environment, the educational system among others, but also the healthcare system (cf. *ibid.*). This understanding encourages the precise scrutiny of formation mechanisms of health and disease in collaboration with the (un)equal distribution in the outpatient and in-patient care. Therefore, this research work aims at generating results about the collaboration of an (un)equal distribution in the internist patient care with a focus on haematology in the areas of outpatient and in-patient care about the mortality from cancerous diseases in Germany. An additional goal is a fact-finding process, if and to what extent socio-economic indicators play a role in this connection.



1.3 Structure of the thesis

Chapter 2 discusses the development of the number of internists with a focus on haematology/oncology distinctively. Here, not only the outpatient but also in-patient sector is examined for the distribution and density. Additionally, also the analysis of social determinants plays an important role in conjunction with internists.

Chapter 3 deals with mortality rate by cancerous diseases. Along with the epidemiological principles, statistics are created that serve the purpose of describing mortality by cancerous diseases. This chapter concludes with an overview on the state of research on the most important cancerous diseases.

In Chapter 4, there search queries are defined with the related sub queries and also the hypothesis leading the research is formulated.

Chapter 5 exclusively deals with the methodical procedure. Here, the actual research process is presented in detail in its sub-processes and the statistical procedures applied for gaining results are extensively described.



2 Statistics on internists for haematology/ oncology

The Federal Republic of Germany consists of 16 federal states and has a federalist organisational principle (cf. DEUTSCHER BUNDESTAG [German Parliament], without date). It is stretched across a surface area of almost 357,000 square km (cf. BUSSE et. al, 2013, p. 1). From this total area, the new federal states² occupy approx. 108,000 square km (30%) and the old around 249,000 square km (70%) (cf. *ibid.*).

In 2014 almost 81.2 million inhabitants lived in Germany. While approx. 20% ($n \approx 12.5$ million) of the German population lives in the new federal states, approx. 80% ($n \approx 65$ million) of the total German population lives in the old federal states (cf. DESTATIS, 2016).

The medical care of citizens in the event of illness has a constitutional provision. The social obligation of the government for public service is derived from that, which also includes the patient care in the event of illness (cf. SIMON, 2013, p. 103). There is a healthcare system to respond in the event of illness, impediment and for repelling health risks of the population (cf. BUSSE et. al, 2013, p. 2). It serves the purpose of organising the patient care of citizens with health-related services and products (cf. VON TROSCHKE/STÖBEL, 2012, p. 15).

An essential characteristic of the German healthcare system is the distinction between the outpatient care that lies within the responsibility of the so-called registered doctors and the in-patient care. Quantification of these patient care areas is considered in the respective statistics of the German Medical Association. Herein, yearly tendencies for the development of medical care in Germany are presented.

2.1 Calculation of the total number

Between 2010 and 2014, the total number of working internists increased from 1660 to 1855 (see ill. 1). That is equivalent to a growth of 11.7% (cf. BÄK 2010, BÄK 2011, BÄK 2012, BÄK 2013, BÄK 2014). Interestingly, in this time period the number of outpatient internists increased almost three times more than the number of their in-patient colleagues: in particular, by 20.2% ($n = 127$) against 7.1% ($n = 67$) (cf. *ibid.*). This development thus presents the principle "outpatient before in-patient" "pursued in the medical services (§13 SGB XII).

² The term "New federal states" includes the region of the earlier German Democratic Republic (cf. BUSSE et. al, 2013, p. 1); the term "Old federal states" refers to the region of the Federal Republic of Germany before the reunification in 1990.

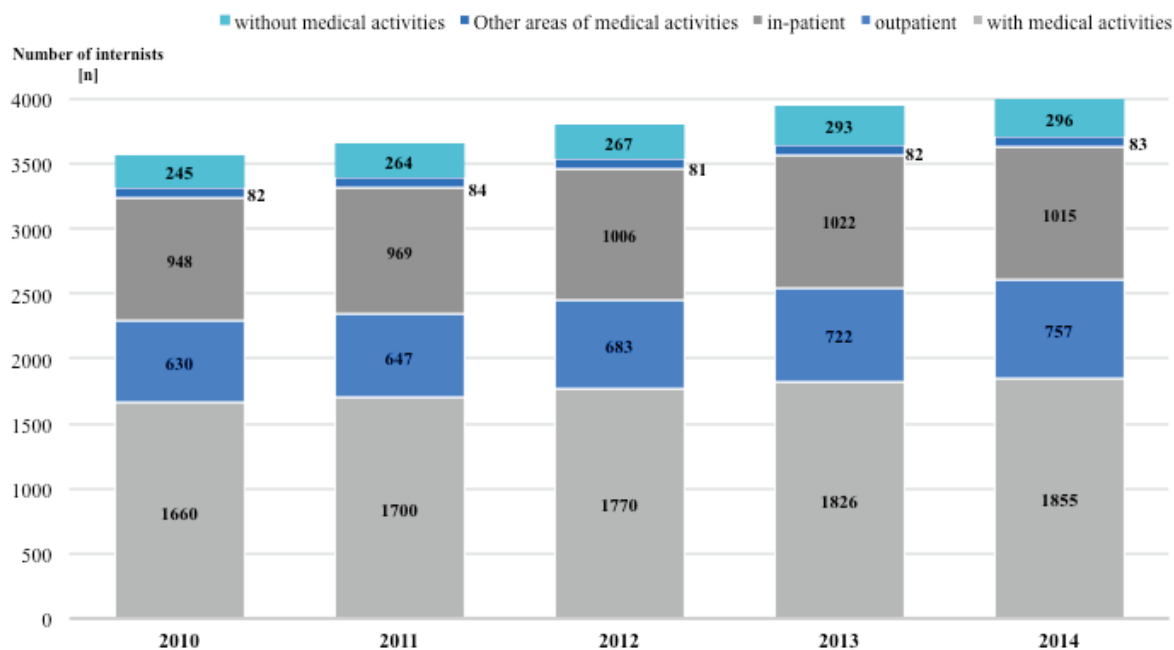


Illustration 1: Development of working internists with a focus on haematology/oncology in Germany from 2010 to 2014 (author's representation, cited as per BÄK 2010, BÄK 2011, BÄK 2012, BÄK 2013, BÄK 2014)

In spite of the overall positive development of internists that specialise in haematology/oncology, the increase was not constant in all fields of activity between 2010 and 2014. Regarding this matter, a slight decline in the medical professionals in the in-patient sector compared to the outpatient sector can be recognised from 2013 to 2014 (cf. BÄK 2013, BÄK 2014).

Other than the curative medicine, in 2010 however only 82 medical professionals and in 2014 83 medical professionals were active, which is equivalent to an increase of 1.2% (cf. BÄK 2010, BÄK 2014). Medical professionals from corporations, authorities among others are assigned to this sector, which is not associated with the direct patient care (cf. BÄK 2010, BÄK 2011, BÄK 2012, BÄK 2013, BÄK 2014).

Additionally, there are those internists as well that do not practice their medical profession (any more) in line with the Para 1 of the Federal Medical Practitioners' Act. Their number increased continuously between 2010 and 2014: namely by a total 9.8%. Doctors that are already retired as well as doctors that are unable to work, in the exemption phase of partial retirement or are on parental leave, or exclusively active in households, active in other professions or unemployed and/or no longer practice their professions due to other reasons belong to this group of internists (cf. BÄK, 2012). The fact that there are internists that are active in other professions or are unemployed and/or no longer practice their professions due



to other reasons, is possibly due to the loss of attraction to the medical profession itself and/or the bad framework conditions (cf. HIBBERLER/KORZILIUS, 2008, p. 609).

2.1.1 Development based on sex

Today, the lack of doctors in oncology and haematology is already significant (cf. GIESEKE, 2013). Additionally, the requirement for patient care grows significantly through the increase in the number of newly diagnosed cancers as a consequence of demographic development in the next years (cf. *ibid.*). That more and more women become doctors is therefore a chance to counter this development (cf. HIBBERLER/KORZILIUS, 2008, p. 610).

A growth in female medical professionals can also be determined in the internists with a focus on haematology/oncology (see ill. 2).

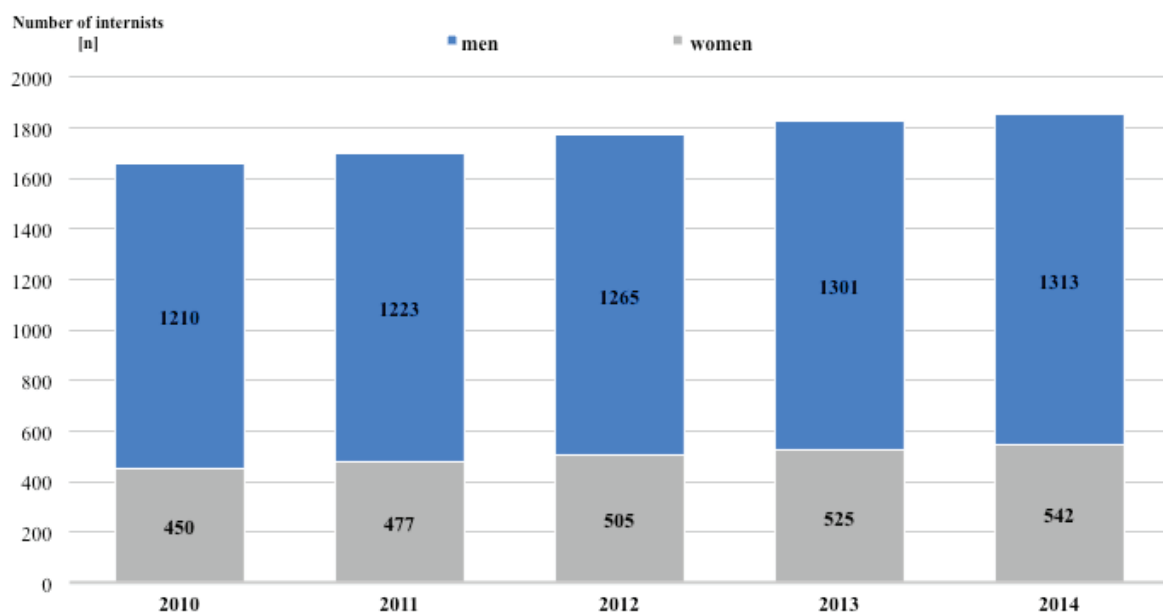


Illustration 2: Development of working internists with a focus on haematology/oncology in Germany from 2010 to 2014 based on sex (author's representation, cited as per BÄK 2010, BÄK 2011, BÄK 2012, BÄK 2013, BÄK 2014)

From 2010 to 2014, the increase in female internists was 20.4% ($n = 92$) (cf. BÄK 2010, BÄK 2011, BÄK 2012, BÄK 2013, BÄK 2014). In male doctors however it was only 7.8% ($n = 103$) (cf. *ibid.*). This development is possibly due to the fact that more women than men take up medical studies (cf. HIBBERLER/KORZILIUS, 2008, p. 609). Thus, already in 2013 almost 70 percent of the new students were female (cf. GIESEKE, 2013).

A distinctive consideration of development based on sex and the fields of activity “in-patient” and “outpatient” shows a similar picture (see tab. 1).



Table 1: Development of working internists with a focus on haematology/oncology in Germany from 2010 to 2014 based on sex and field of activity (author's representation, cited as per BÄK, 2015)

Year	Women		Men	
	In-patient	Outpatient	In-patient	Outpatient
2010	261	157	687	473
2011	273	172	696	475
2012	291	183	715	500
2013	299	194	723	528
2014	301	214	714	543

From 2010 to 2014, the number of female internists in outpatient sector increased 36.6% ($n = 84$), whereas the increase in male colleagues was only 14.8% ($n = 70$) (cf. BÄK 2010, BÄK 2011, BÄK 2012, BÄK 2013, BÄK 2014). In the same observation period, the number of female internists in the in-patient sector of activity grew from 261 female medical professionals to 301 – an increase of 15.3% ($n = 40$). However, in male medical professionals, it was only 3.8%, which amounts to an absolute growth of 27 medical professionals in 5 years (cf. *ibid.*). This development again reflects the principle “outpatient before in-patient” (§13 SGB XII).

2.1.2 Development by age

“As society ages, so do medical professionals” (BÄK, 2014). In 2014, the share of 40 to 49-year-old internists based on the total number of working medical specialists was 39.9% ($n = 740$). For comparison: In 2010 it was still 49.3% ($n = 822$). Furthermore, the share of 50 to 59-year-old internists grew from 31/3% ($n = 520$) in 2010 by approx. 8% ($n = 209$) to 39.3% in 2014 (cf. BÄK 2010, BÄK 2011, BÄK 2012, BÄK 2013, BÄK 2014) (see ill. 3).

A growing development between 2010 and 2014 also shows the age-cohort of 60 to 66 year olds. In 2010, the share of internists was 8.1% ($n = 134$) measured from the total number of working medical specialists, in 2014 it was already 11.4% ($n = 211$) (cf. BÄK 2010, BÄK 2011, BÄK 2012, BÄK 2013, BÄK 2014) (see ill. 3).

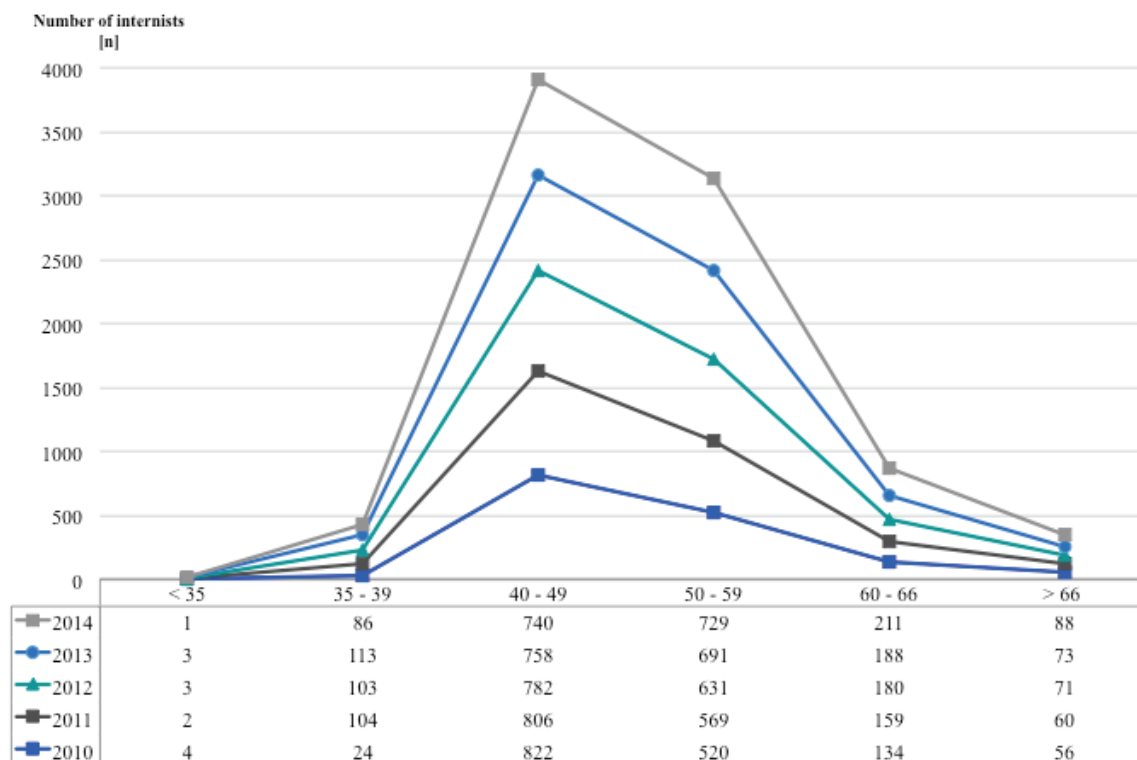


Illustration 3: Development of working internists with a focus on haematology/oncology in Germany from 2010 to 2014 by age (author's representation, cited as per BÄK 2010, BÄK 2011, BÄK 2012, BÄK 2013, BÄK 2014)

A consideration of the age distribution by fields of activity allows an extended view in the demographic structure of this discipline of medical specialists.

Table 2: Development of working internists with a focus on haematology/oncology in Germany from 2010 to 2014 by age and field of activity (author's representation, cited as per BÄK 2010, BÄK 2011, BÄK 2012, BÄK 2013, BÄK 2014)

Year	In-patient				Outpatient			
	Age				Age			
	< 39	40-49	50-59	60- > 66	< 35-39	40-49	50-59	> 60
2010	93	480	281	94	24	305	225	76
2011	82	474	309	103	15	296	241	95
2012	82	476	326	119	17	276	278	112
2013	85	455	362	117	25	272	302	123
2014	65	453	361	135	19	262	339	137

In 2010, internists under 39 amounted to 9.8% (n = 93) in the in-patient sector based on the total number of 948 male and female doctors (cf. BÄK 2010, BÄK 2011, BÄK 2012, BÄK 2013, BÄK 2014). In 2014, there were only 6.4% (n = 65). Therefore, the share in this age-cohort shrunk to 3.4% (cf. *ibid.*). The age-cohort of 40 to 49-year-old internists shows a similar development. In this case, the share of internists declined from 50.6% in 2010 to



44.6% in 2014. On the other hand, the share of internists between the age 50 to 59 grew in the same observation period exactly by 6% (cf. *ibid.*). It is respectively based on the total number of internists in the underlying years.

The outpatient sector presents a similar picture. In 2010, the share of internists under 39 active in outpatient care was 3.8%, in 2014 however it was 2.5% — respectively calculated from the total number (cf. BÄK 2010, BÄK 2011, BÄK 2012, BÄK 2013, BÄK 2014). A far bigger decline is defined with 13.8% by the ageing population in 40 to 49-year-old (cf. *ibid.*). For comparison: In the in-patient sector the decline in the same age-cohort was less than half with 6%. If the share of internists between 40 to 49 was declining, it increased on the other hand in the 50 to 59-year-old and older than 60 years — namely from 35.7% in 2010 to 44.5% in 2014 and/or from 12% to 18.1% (cf. *ibid.*).

2.2 Structure of internists

From 2010 to 2014, the patient care capacities in the outpatient and in-patient areas constantly increased in internists with a focus on haematology/oncology. That could be shown in Chapter 2.1 ff. already.

However, for a nationwide patient care of federal German population, not only is a sufficient number of medical services important, but also the availability and density (of medical services) in particular.

2.2.1 Ratio of internists to patient care area

The demand for availability for the population in case of necessity of an internist-medical service can be answered by the patient care area that a working internist with a focus on haematology/oncology covers. This patient care area can also be described synonymously as catchment area of an internist. For this purpose, Illustration 4 shows that between 2010 and 2014 the patient care area has declined from 215 square km to 193 square km — which is equal to a decline by 10.2% and/or 22 square km (cf. BÄK 2010, BÄK 2011, BÄK 2012, BÄK 2013, BÄK 2014, DESTATIS 2016).

Differentiation by fields of activity presents a similar trend. However, this trend is different in the observation period between the outpatient and in-patient sector. In the outpatient sector the patient care area reduced in the observation period by 16.8% (= 95 square km), in the in-patient sector only by 6.6% (= 25 square km).