

Epidemiology, health care needs and care volumes of peripheral venous diseases in Germany: multi-source analysis of primary and secondary data

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Keywords

Phlebology, health care, epidemiology

Summary

Background: Vein diseases are frequent and medically relevant. **Objective:** To characterize phlebological health care and treatment needs in Germany. **Methods:** Multisource analysis of data from the sick funds, the Federal Statistical Office and primary studies. **Results:** In Germany, at least 22% of the population (18 million) suffer from venous diseases requiring treatment. 4.1 million phlebological ambulant treatments are carried out annually, about 125,000 hospital cases are documented as the main diagnosis, including approx. 88,500 with varicosis and approx. 35,300 with thrombo(phlebitis). The number of inpatient treatments for varicosis has decreased by 16% in the last 10 years, by 47% in the last 17 years, and the number of outpatient phlebological treatments has increased by 5–10% annually in the last 5

years. Main ambulant health care specialists are surgeons and dermatologists, main inpatient departments are surgery, dermatology and angiology as well as professional vein clinics. Health care needs will increase by 3–8% annually in the future. Being a major part of quality-assured care, 3,049 physicians in 2016 had a certified additional training in phlebology. **Conclusion:** Peripheral venous diseases require a high level of care in Germany. Phlebology and certified phlebologists are an important pillar of the specialised care needed.

Schlüsselwörter

Phlebologie, Versorgung, Epidemiologie

Zusammenfassung

Hintergrund: Venenleiden sind häufig und medizinisch relevant. **Fragestellungen:** Wie ist die Versorgung der Venenkrankheiten in

Deutschland, wie entwickelt sich der Bedarf?

Methoden: Multisource-Analyse von Daten der GKV, des statistischen Bundesamtes sowie Primärstudien in Deutschland. **Ergebnisse:** In Deutschland leiden mind. 22% der Bevölkerung (18 Mio.) unter behandlungsbedürftigen Venenerkrankungen. Ambulant werden jährlich 4,1 Mio. phlebologische Behandlungen durchgeführt, stationär etwa 125 000 Fälle als Hauptdiagnose dokumentiert, davon ca. 88 500 mit Varizen der unteren Extremität und ca. 35 300 mit (Thrombo-)Phlebitis. Die Anzahl stationärer Behandlungen für Varizen ist in den letzten 10 Jahren um 16% zurückgegangen, in den letzten 17 Jahren um 47%, die Anzahl ambulanter phlebologischer Behandlungen in den letzten 5 Jahren jährlich um 5–10% gestiegen. Ambulant hauptversorgende Fachgruppen sind Chirurgen und Dermatologen, stationär versorgende Chirurgie, Dermatologie und Angiologie sowie Venenfachkliniken. Der Versorgungsbedarf wird zukünftig jährlich um 3–8% steigen. Die Zusatzweiterbildung „Phlebologie“ als Teil der qualitätsgesicherten Versorgung wurde in Deutschland 2016 von 3 049 Ärzten geführt. **Fazit:** Periphere Venenerkrankungen weisen einen hohen Versorgungsbedarf auf. Die Phlebologie stellt eine wichtige Säule der spezialisierten Versorgung dar.

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Epidemiologie, Versorgungsbedarf und Versorgungsvolumina peripherer Venenkrankheiten in Deutschland: Multi-Source Analyse von Primär- und Sekundärdaten

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Background

Peripheral venous diseases are some of the most common diseases in Germany. They range from minor distal symptoms to severe chronic wounds and fatal complications such as deep vein thrombosis. Chronic venous disease (CVD) encompasses the entire spectrum of anatomical and functional abnormalities of the venous system of the legs, beginning with spider veins and teleangiectasias up to and including venous ulcers (1). On the other hand, chronic venous insufficiency (CVI) refers to those states of a venous disease that are associated with clinical symptoms such as swelling, a feeling of heaviness and/or skin complications such as stasis dermatitis, hyperpigmentation, dermatosclerosis or even venous leg ulcer.

The guidelines on care and management of venous diseases include the primary prevention of venous incompetence, early detection of risk patients and the avoidance of trigger factors, as well as the appropriate conservative and/or surgical management (2). The main care providers are physicians with an additional qualification in phlebology, for whom the certified further training in phlebology was introduced in 1993 (3). The future care of people in Germany with peripheral venous diseases of the lower extremity, with consideration of its quality and coverage of health care needs is discussed in this article. The importance of the certified additional training in phlebology for health care in Germany is also addressed.

Questions

1. How common are venous diseases of the leg in Germany?
2. How often are they managed in an ambulatory setting, how often on an inpatient basis?
3. Which specialist departments/groups undertake this care and in what proportion?
4. How high are the future care needs for peripheral venous diseases?
5. What is the importance of this care for community-based dermatologists in particular?

Methods

Study design

Health care research analysis based on primary data (population-based surveys, surveys of physicians) and secondary data (statutory health insurance providers, Destatis [German Federal Statistical Office]), using descriptive statistics. Analytical methods of clinical epidemiology, health economics and social sciences were used. The methodological approach of this study was based on the procedures of the Institute for Health Services Research in Dermatology and Nursing (IVDP) and the methodological standards of health care research (4–12). The analysis was carried out in April 2018 based on data of 2016.

The target indications were broadly all diseases of the peripheral venous system recorded in Germany by the ICD-10 codes I80.-, I82.- and I83.- (13). In the narrower sense, the analysis related to the ICD-10 diagnoses I80.- “Thrombosis, phlebitis and thrombophlebitis” and I83.- “Varicose veins of the lower extremities”. However, the lack of clinical differentiations that are not adequately represented by the ICD code should be pointed out. More extensive diagnostic codes were used for the primary data investigations by physicians qualified in phlebology. The evaluations of the DAK (a nationwide statutory health insurance [SHI]) datasets was based on the ICD-10 code I87.

Epidemiology of peripheral venous diseases – primary data analysis

The epidemiological data for Germany were taken from the published documents, or from a recently finalised population-based, nationwide study. Using standardised anamnestic interviews, clinical findings and Doppler sonography, the latter study analysed the presence of chronic venous diseases diagnosed by vein specialists in 19,104 people of working age in 51 companies from various branches (14).

Frequency of inpatient cases

Hospital cases were obtained from the nationwide hospital data of the Federal Statistical Office (15). These statistics represent a sample of the entire scope of inpatient care. Descriptive statistics were used to analyse the data for the years 2007–2016 compared with those of 2000 for ICD-10 codes I80.-, I82.- and I83.- for a) the entire diagnostic group, b) according to specialist department, c) both coded according to sex.

The evaluation set of the DAK with approx. 5.9 million insured persons was used to test the results and provide data for further evaluations. The data were taken from the project analysis of a 40% sample, which is more than sufficient for investigating the research questions.

Proportion of specialist departments

The specialist department code was taken from the Destatis hospital statistics. Inpatient care was only analysed at case level, because this is also the basis for billing and comparison. In the same way, the specialist department code was used to analyse the secondary data.

Ambulatory care

The services provided by ambulatory care were analysed on the basis of the SHI data obtained as previously described.

The SHI-codes for medical procedures are shown in ► Table 1.

Proportion of outpatient specialist care

The specialist code was used to determine the proportion of such physicians involved in ambulatory care.

Analysis of current and future health care needs

Current and future health care needs were determined on the basis of the epidemiology of venous diseases, the treatment needs in the primary data records and the pre-

Tab. 1 Coding used for secondary data analysis (16). FSN = fee schedule number

Description	Use	FSN	FSN description	OP code	OP code description
Operation, vascular intervention					
Sclerotherapy of varicose veins (treatment of epifascial reflux)	Surgery for epifascial reflux	30501	Sclerotherapy of varicose veins	5–385	Ligation, excision and stripping of varicose veins
	High ligation and stripping of the great or small saphenous vein	30501	Sclerotherapy of varicose veins	5–385.74	Ligation, excision and stripping of varicose veins: High ligation and stripping of the great and small saphenous veins
	Tributary exeresis	30501	Sclerotherapy of varicose veins	5–385.9	Ligation, excision and stripping of varicose veins: Exeresis (as an independent procedure)
	Foam sclerotherapy of truncal or tributary varicosis (sclerotherapy)	30501	Sclerotherapy of varicose veins	5–385.c	Ligation, excision and stripping of varicose veins: Endoluminal rotation ablation with simultaneous sclerotherapy
	Radiofrequency obliteration (RFO)	30501	Sclerotherapy of varicose veins	5–385.b	Ligation, excision and stripping of varicose veins: Endoluminal radiofrequency ablation
	Endovenous laser therapy (EVLT)	30501	Sclerotherapy of varicose veins	5–385.a1	Ligation, excision and stripping of varicose veins: Laser therapy: Endovenous [EVLT]
	Paratibial fasciotomy with (dissection/ligature of perforator) (paratibial fasciotomy (PTF) T3 – recommendation C)	30501	Sclerotherapy of varicose veins	5–385.6	Ligation, excision and stripping of varicose veins: Endoscopic dissection of the perforating veins with fasciotomy (as an independent procedure)
	Endoscopic subfascial dissection of perforators (ESDP)	30501	Sclerotherapy of varicose veins	5–385.5 5–385.6	Ligation, excision and stripping of varicose veins: Endoscopic dissection of the perforating veins (as an independent procedure)
	Reconstruction and transplantation of vein valves			5–383.9 **	Resection and replacement (interposition) of (parts of) blood vessels: Deep veins [6. position: 1-k,x]
	Shave operation and other local surgical procedures e.g. split-skin transplant			5–913	Removal of superficial layers of skin
	Destruction of diseased tissue			5–915	Destruction of diseased tissue

dicted demographic changes according to the IVDP model (► Fig. 1).

Frequency of the certified additional qualification in phlebology

The frequency of the certified additional qualification in phlebology was taken from the Federal Health Report (3).

Ambulatory care by dermatologists

The characteristics of phlebological care provided by dermatologists were recorded in a structured online survey of community-based dermatologists in Germany in 2018 (17).

Importance of the certified additional training in phlebology for the provision of care

The question regarding the proportion and benefit of physicians holding the certified additional qualification in phlebology was assessed in a narrative manner in the overall picture of the available data.

Results

Epidemiology of peripheral venous diseases – analysis of primary data

The primary data study of the IVDP analysed the data of 19,104 employees of 51 companies throughout Germany. The average age was 46.1 ± 9.8 years, 53.5% were male and the mean body mass index (BMI) was $26.1 \text{ kg/m}^2 \pm 4.4$. Of these subjects, 21.1% ($n = 4038$) had received at least one

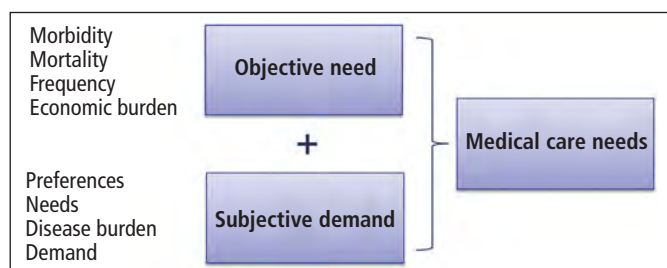


Fig. 1 System for evaluating medical care needs

treatment-requiring diagnosis related to CVI. A specific venous treatment including further investigation of unclear findings was recommended in 22.3% (n = 4260). Differentiation according to the CEAP criteria revealed that 60% of the patients with Stage ≥ C 1 (n=7217) were diagnosed with varicose veins (► Fig. 2).

The results largely correspond to the data earlier recorded independently by Rabe et al. (18), who found that approx. 17% of the population had chronic venous insufficiency and hence treatment-requiring venous findings of the lower extremity and that this had an overall prevalence of approx. 30% of all venous diseases.

Frequency of inpatient cases 2007–2016

Destatis documented 88,561 inpatient cases with the diagnosis of “Varicose veins of lower extremities” (ICD-10: I83.-) in 2016 (► Fig. 3). 51% of these cases were men and 49% women and the diagnosis led to approx. 345,000 inpatient treatment days.

The diagnosis of “Thrombosis, phlebitis and thrombophlebitis” (ICD-10: I80.-) was recorded in 35,308 cases (0.18% of all inpatient cases in Germany) and accounted for 321,000 inpatient treatment days.

“Other venous embolism and thrombosis” (ICD-10: I82) was diagnosed less frequently with 1953 cases and is not clearly assigned to a location. In the same way, cases subsumed under “Other disorders of

veins” (ICD-10: I87.-) cannot be interpreted.

With a total number of 20,063,689 inpatient cases, the 125,822 cases of specific diagnoses for venous diseases of the lower extremities accounted for some 0.63% of inpatient cases in Germany. Compared to the last 10 years, this corresponded to a reduction in inpatient cases of 16% from 105,195 (2007) to 88,561 (2016). This reduction is somewhat higher (25%) for I80.- “Thrombosis, phlebitis and thrombophlebitis”. Compared to the previous decrease between 2000 and 2007, the reduction was slightly lower.

Proportion of specialist departments

A combination of the SHI and Destatis hospital statistics shows that of the 88,561

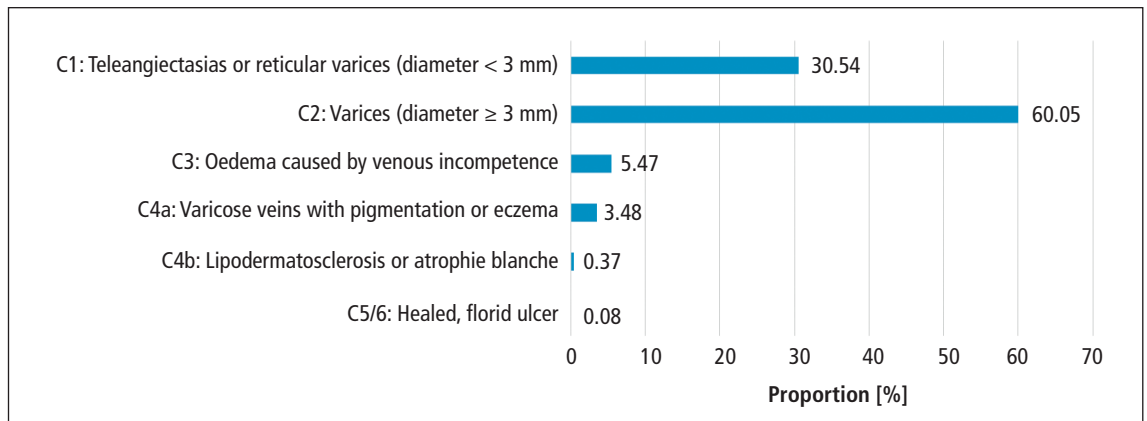


Fig. 2 Clinical CEAP stages of persons with venous diseases (n = 7217) (14)

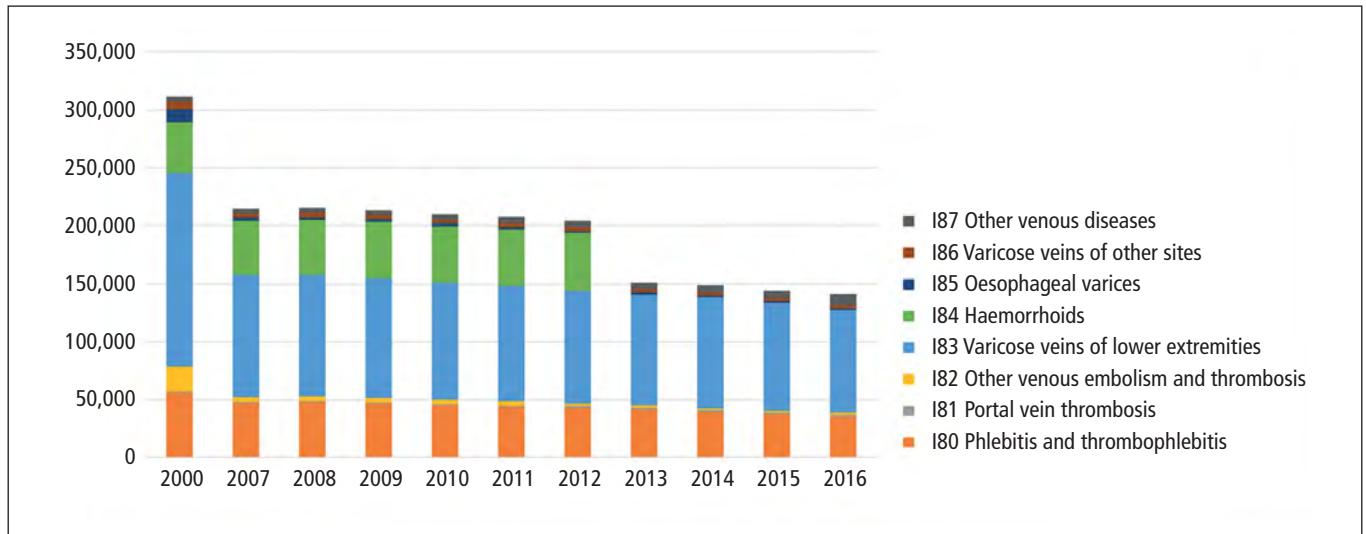


Fig. 3 Inpatient treatment days in 2016 for varicose veins (ICD-10: I83.-) and other venous diseases during the course of the last 10 years, compared with 2000; data from Destatis (15)

inpatient treatment cases, the specialist departments most frequently undertaking interventions were general surgery with 32% and vascular surgery with 23%. Dermatology departments took third place with 16%, followed by several specialist departments of internal medicine.

Ambulatory care

The services provided by ambulatory care were analysed on the basis of the SHI data. In 2010, 83,202 treatments were given to those insured with DAK, of which 83,110 were ambulatory and 168 inpatients (► Table 2). The yearly treatment prevalence (ICD-100 GM I87) amounted to 3.59%, of which 3.58% was ambulatory and 0.01% inpatient. The annual increase in

treatments up to 2015 was between 5% and 10%. A total of 3,195 vascular interventions were carried out, of which 2,007 were ambulatory (65.8%) and 1,274 inpatient (39.9%).

When analysed on a federal state basis, regional differences were found both in terms of treatments and for interventions (► Table 3).

Ambulatory specialist physicians

General surgeons (27.2%) and dermatologists (25.1%) were the specialist groups most often involved (at least one contact per year) in the interventional care of peripheral venous diseases, followed by general practitioners (18.6%) (► Table 4).

Disease burden of venous diseases

According to the German data, venous diseases cause an impairment in quality of life that increases with the stage of the disease (19–22).

The economic significance of venous diseases is high because of their frequency. The venous leg ulcers that occur in advanced stages are the most important complication in terms of disease costs (23, 24).

Analysis of current and future health care needs

21.1% (n = 4,038) of those investigated in the primary data study of the IVDP from 2009 to 2015 had at least one CVI-related diagnosis. In the logistic regression analysis, together with age, sex and BMI, the occurrence of varicose veins in the family was

Tab. 2 Percentage of insured persons with CVI and the phlebological surgical-interventional care volumes in the DAK data stratified according to the German federal states, 2010. *IVDP evaluation of DAK secondary data 2010

	Total CVI*		Vascular interventions total CVI*	
	n	Rate (%)	n	Rate (%)
Baden-Württemberg	9774	3.62	494	1.34
Bayern	13407	4.04	570	0.86
Berlin	2372	2.72	61	0.44
Brandenburg	2880	3.14	103	0.47
Bremen	436	2.94	11	0.28
Hamburg	2254	3.14	83	0.64
Hessen	7511	3.45	335	1.02
Mecklenburg-Vorpommern	2484	3.80	64	0.45
Niedersachsen	7924	3.09	239	0.62
Nordrhein-Westfalen	16775	3.85	525	0.83
Rheinland-Pfalz	5352	3.76	309	1.22
Saarland	1253	4.05	132	2.18
Sachsen	2136	3.43	69	0.59
Sachsen-Anhalt	2123	4.66	41	0.40
Schleswig-Holstein	3039	2.68	90	0.65
Thüringen	2585	4.67	37	0.24
~ No assignment	897	3.26	32	0.45

	Rate in 2010				Age			
	n	Rate (%)	Lower 0.95 CI (%)	Upper 0.95 CI (%)	Mean	Standard deviation	Min	Max
CVI Total*	83,202	3.59	3.56	3.61	67.11	14.17	3	106
CVI ambulatory	83,110	3.58	3.56	3.61	67.11	14.16	3	106
CVI inpatient	168	0.01	0.01	0.01	65.29	17.52	3	95
Vascular interventions for CVI Total*	3,195	3.84	3.71	3.97	60.13	13.65	14	96
Ambulatory vascular intervention for CVI	2,007	2.41	2.31	2.52	58.70	13.77	17	96
Inpatient vascular intervention for CVI	1,274	1.53	1.45	1.61	62.40	13.01	14	96

Tab. 3

Care volumes for peripheral venous diseases in the DAK data, year 2010. *IVDP evaluation of DAK secondary data 2010

a significant risk factor for CVI. In the view of the investigating phlebologist, 22.3% of the patients recorded in the primary data study required treatment. This most often concerned compression therapy, followed by vein surgery (► Fig. 4) (14).

A limitation of the study was the focus on adults below the age of 70, which underestimated the prevalence in the population, because older people regularly show a higher rate of venous diseases. For example, according to the data in the Barmer [SHI] Report 2011, the prevalence in those aged over 70 was >70% (► Fig. 5) (25). On this basis, the age-related calculation of phlebological care needs is at least 30% of the total population.

Against this background, even today there is a far greater proportion than 22% in the overall population in need of phlebological care. Furthermore, due to demographic changes, there is likely to be a further increase in care needs for peripheral venous diseases in the future.

Quality of care

There is also likely to be a continuously increasing need for better qualified care, because important quality indicators in Germany are not adequately achieved – for instance, in the care of venous ulcers. Only about 40% of venous wounds are managed by compression therapy as set out in the guidelines (► Fig. 6) (26, 27).

The guideline-conforming quality of care according to the care index is higher with wound management specialists (► Fig. 7) (28). The most important predictor of a high quality of care was the qualification (specialisation) of the care provider. On both medical as well as economic grounds, it must therefore be ensured that experts are brought in for the care of vascular wounds. As the most common wounds of the lower extremity, vein-related wounds require special phlebological treatment.

Even among the doctors and nurses actively engaged in this field, only a small proportion showed practical competence in the application of venous compression bandages (29). This suggests that consistent care should be initiated by physicians

Tab. 4 Proportion of specialist groups involved in the ambulatory care of DAK-insured persons in 2010 (contacts n = 2,007). *IVDP evaluation of DAK secondary data 2010.

At least one contact per patient per year		
Ambulatory vascular interventions for CVI		
	n	Rate (%)
Missing/no visit to doctor	263	13.10
General practitioner	374	18.63
Other	4	0.20
Surgeon	545	27.15
Vascular surgeon	260	12.95
Orthopaedist	1	0.05
Dermatologist	503	25.06
Internist	169	8.42

qualified in phlebology and that the quality of this care should be systematically tested.

this number rose continuously to reach 3,049 by 2016 (► Fig. 8).

Frequency of certified additional training in phlebology

In 1994, 175 physicians held the certified additional qualification in phlebology and

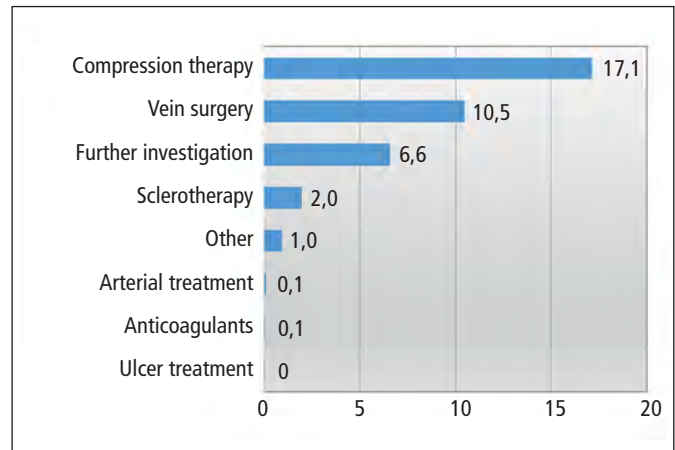


Fig. 4 Necessary phlebological treatment in the general working population (n = 19,104) (14)

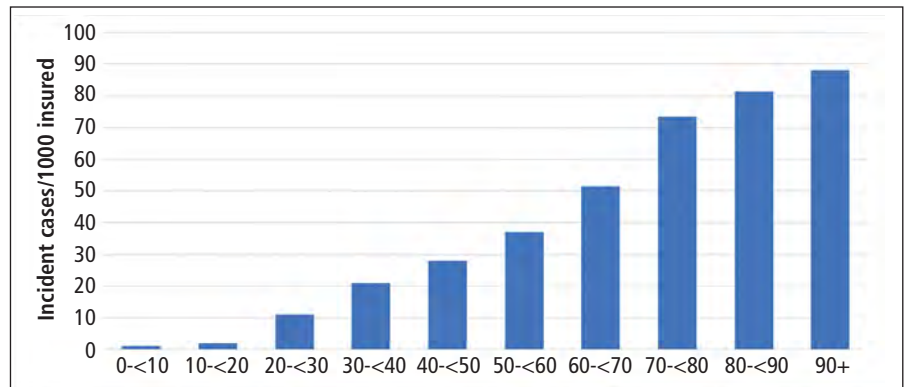


Fig. 5 Age-related prevalence of venous diseases in the Barmer SHI data, Report 2011 (25)

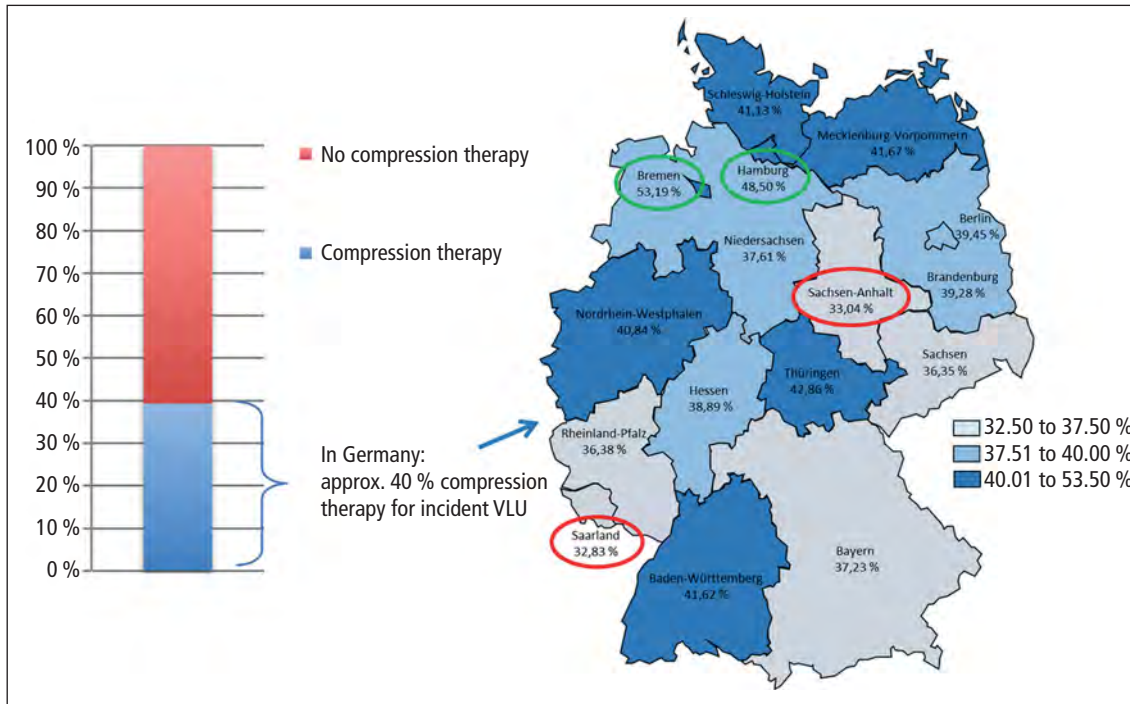


Fig. 6 Management of venous leg ulcers (VLU) in Germany with compression treatment and its regional differences (basis: n = 9.1 mill. insured with Barmer [27])

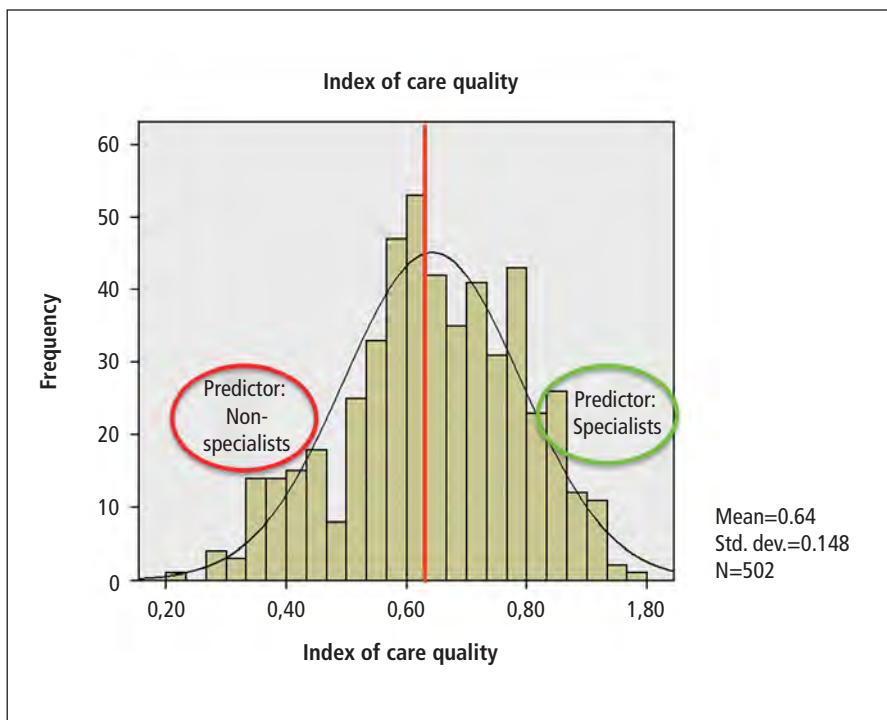


Fig. 7 Distribution of the care index for chronic wounds, including venous ulcers (28)

Discussion

The aim of this multi-source analysis of health care provision was to characterise the care and care needs of peripheral ve-

nous diseases in Germany. Due to the high prevalence of venous diseases, the great demand for care as recorded by the primary data and the high specialisation in the various medical specialist groups, the analysis reveals a discernible need for expert care of

people with venous diseases in Germany. Both primary prevention as well as the early identification of risk patients and risk factors are of great importance for appropriate care. Evidence-based, guideline-conforming knowledge and manual skills in the wide spectrum of care must be available in these areas of prevention as well as in treatment.

The continuing trend of transferring the care of venous diseases into the ambulatory setting is evident and underlines the growing need for care in this sector. As specialisation, for which the acquired medical knowledge is no longer sufficient, is increasing in all specialties, especially in ambulatory dermatology and surgery, it is unlikely that specialised phlebological care will be provided across all disciplines, and this cannot be endorsed. Two aspects suggest this is the case:

1) Studies of health care provision clearly show that only a small number of doctors and nurses in Germany possess the practical skills for mastering the fundamental elements of guideline-conforming care of venous diseases, such as compression therapy for venous incompetence (30).

2) Both secondary data (24) and primary data (8) for the quality indicator “Prescribing of compression therapy” for

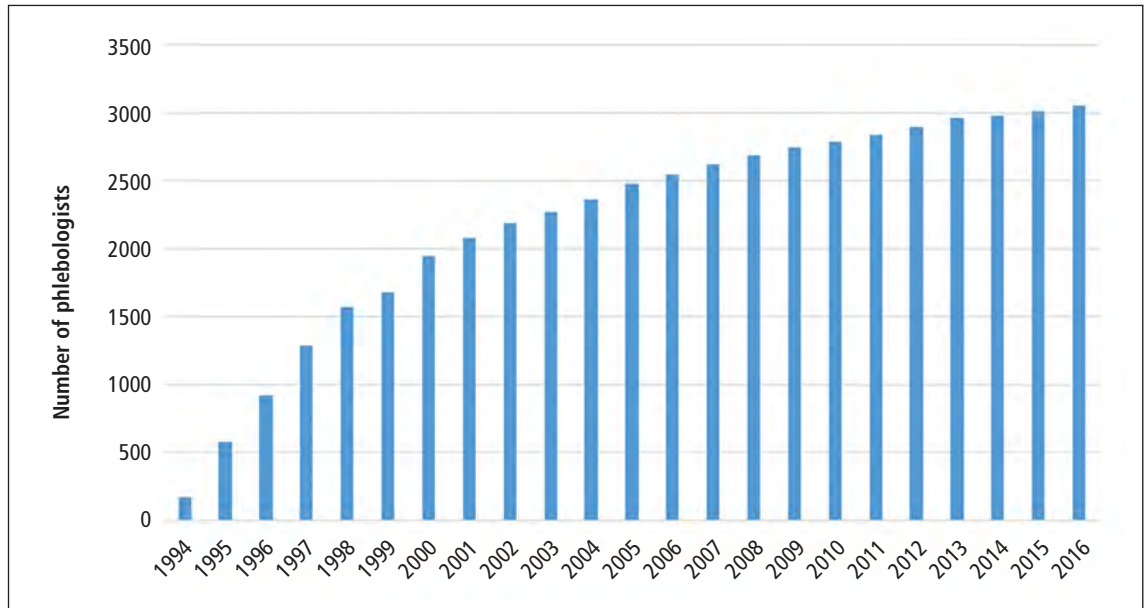


Fig. 8
Number of physicians in Germany holding the certified additional qualification in phlebology since 1994 (3)

venous diseases show that care is not adequate throughout the country. In addition, appropriate phlebological care also has significant economic benefits (31). Phlebology is the broad, interdisciplinary, cross-sectional specialty that binds together general medical practitioners, surgeons and dermatologists. From the viewpoint of patients, the ability to identify phlebological experts is a mandatory social right enshrined in the health care system. The certified additional qualification in phlebology also serves to implement health competence in the population, as it cannot be achieved across all medical specialties.

This multi-source approach also underlines the high significance of health care research for the understanding, quality assurance and future direction of important medical disciplines such as phlebology.

Conflict of interest

The authors declare that there are no conflicts of interest.

Ethical guidelines

No studies in humans or animals were conducted for the manuscript.

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