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How are social determinants of health represented in German medical education? – A qualitative content analysis of key-curricular documents

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Abstract

Objective: The WHO Commission on Social Determinants of Health has called for a health workforce trained in recognising, understanding and acting on the social determinants of health (SDH). However, little is known about how current medical education prepares graduates for this challenge. This study analyses the extent to which the German medical education incorporates content on SDH.

Design: Following a published protocol, in 2018 we conducted a qualitative and quantitative content analysis of three key document groups, defining and guiding what medical schools are expected to teach and what medical students are expected to know when graduating in Germany. We developed the coding system in a mixed inductive and deductive approach based on key WHO documents.

Results: Important gaps exist in the representation of SDH in medical education in Germany. Between 3% and 27% of the analyzed document-elements made reference to SDH and only 0% to 3% of those document-elements made explicit references to SDH. While some aspects were covered widely (e.g. topics of occupational health, early childhood development and hygiene), other topics such as health inequalities or determinants outside of the health care system were not or hardly represented.

Conclusions: A stronger and more explicit representation of SDH in German medical education is needed to prepare the new health workforce for current and future challenges in our globalized world and for medical schools to be socially accountable.

Strengths and limitations of this study

- The content analysis is based on a pre-developed and peer-reviewed study protocol and followed the good scientific practice for qualitative research.
- This is the first study to assess social determinants of health in medical education in the comprehensive way of analyzing current key-documents for medical education in Germany.
- This analysis does not cover the curricula of individual medical schools, locally developed learning materials or electives (e.g. developed and run locally by committed students and teachers).
- This study does not address how a medical curriculum covering all important aspects of SDH could be developed in practice and if the applied 12 codes are sufficient to cover the broad spectrum of SDH in teaching.

Introduction

The WHO has defined social determinants of health (SDH) as the conditions in which people are born, grow, live, and age and the wider set of forces and systems shaping the conditions of daily life[1].

There is robust evidence that SDH have a strong and far-reaching impact on health at the individual and population level[2-5], and that the observed inequalities in health outcomes between individuals and populations are for the most part attributable to inequalities in SDH[1,6,7]. Social inequity in particular has been widely recognized as a key driving factor for differences in health status – on the international, national, regional and local level[1,8,9]. Awareness of the importance of the socioeconomic status and health and the causes for the differences in risk-factors and health outcomes is important for an adequate treatment of vulnerable populations and an adequate understanding of their needs. Knowledge of and skills in the field of SDH can support physicians in their everyday practice, for example by improving the understanding of patients' adherence to particular treatment regimens[10-12]. Acknowledging the importance of SDH, the WHO Commission on Social Determinants of Health (CSDH) emphasizes the necessity and advantage of a SDH-framed mind-set for health professionals. It recommends that SDH should be a standard and compulsory part of the training of medical students and other health professionals[1].

This is in line with calls for the increased social accountability of medical schools. Social accountability is based on the idea that medical schools should address the "the priority health needs of the community, region, and/or nation they have a mandate to serve"[13,14]. In order to do this, the graduates need to be "prepared as change agents for a more equitable and performing health system"[15]. The Lancet Commission on medical education for the 21st century calls for competency-led curricula which prepare healthcare professionals for the

challenges in the future arguing that "fragmented, outdated and static curricula are producing ill-equipped graduates"[16]. However, little is known so far about the current role SDH play in the German medical education system. A study from the late 1990's which investigated the role of social medicine in 32 curricula of German medical schools documented a substantial neglect of this subject[17]. To our best knowledge, no in-depth study of the representation of SDH in current medical education in Germany has been conducted.

Against this background, our study aims to answer the following questions: (1) To what extent do the national education frameworks for medical students include references to SDH? (2) Which thematic focus is currently set in the incorporation of SDH? (3) Which strengths and weaknesses exist in the thematic coverage?

Methods

We conducted a qualitative and quantitative content analysis of three key document groups, covering what medical schools are expected to teach and what medical students are expected to know when graduating. The methods of our analysis are outlined in detail in our study protocol[18].

Data sources

We analyzed the following documents:

(1) Germany's 'National Competency-Based Catalogue of Learning Objectives for Medicine' (*Nationaler Kompetenzbasierter Lernzielkatalog Medizin)* (=NKLM). The NKLM was developed by the German Association for Medical Education and the German Medical Faculty Association, adopted in 2015 and is currently under revision. The NKLM states the profile and competencies for every student graduating

from medical studies. The content of the NKLM is structured into three levels: *competencies* (level 1), *sub-competencies* (level 2) and *learning objectives (level 3)*. *Practical examples* substantiate these three levels.

(2) The Content Catalogue for the Second Part of the Examination of Doctors, provided by the German Institute for Medical and Pharmaceutical Examination Questions (IMPP) (*IMPP Gegenstandskatalog für den zweiten Abschnitt der ärztlichen Prüfung)* (=GK2). The IMPP-GK2 is the content framework for the national medical licensing examination, a nationwide examination covering the content of the clinical phase of medical studies, which the students are required to pass in order to move on to the final year of practical education. The GK2 document consists of three parts: (i) *introduction* (ii) *health disorders* and (iii) *diseases and syndromes*. Part ii consists of a list of health disorders in alphabetical and systematical order *(*e.g. “depression”, ”diarrhea”). Part iii lists health disorders oriented towards the ICD-10 system (e.g. “A20-A28 Certain bacterial zoonosis”, “A 20 Plague”, “A 21 Tularemia”, etc.).

(3) The full set of questions from two national medical licensing examinations (*Zweiter Abschnitt der ärztlichen Prüfung)* (=EXAM), held in 2016 (the most recent examinations available at the beginning of the study), provided by the IMPP. Each EXAM consists of 320 multiple-choice questions and 12 case studies. The multiple-choice questions often provide a short contextualization and are mostly 20-200 words in length with five options provided as answer options. The case studies are descriptions of a specific clinical case with a length between 500 and 1500 words to which around 15 questions are assigned to. For the EXAM, we calculated separately the number of questions to which at least one code was applied relative to the number of all questions (“Questions” in figure 2) and the number of case studies to

which at least one code as applied (to their entire length) relative to the overall number of case studies ("case studies" in figure 2).

Our study protocol provides a detailed description of these documents and their role in the German medical education system[18]. A summary of the study results focused on the NKLM contributed to the current debate on the NKLM revision process in Germany[19].

Data analysis

The development of the coding framework is described in the study protocol by Hommes et al[18]. The data were analyzed using MAXQDA 12 (VERBI, Berlin, Germany). In order to maximize intersubjectivity, consistency and reproducibility, we developed coding guidance in the form of definitions, an overview of key components, inclusion and exclusion criteria for individual codes, as well as general coding guidelines applicable to all codes[18]. The coding framework consists of 12 codes (figure 1) plus two auxiliary codes: (1) *Socioeconomic status & health*, to be applied to passages with reference to the interaction between socioeconomic status and health (e.g. by discussing the interaction between poverty and health outcomes) and (2) *explicit*, to be applied to passages making an explicit reference to SDH-relevant aspects, (e.g. by discussing the impact of a family environment affecting a child's access to medical services) instead of merely mentioning SDH (e.g. by mentioning different social environments).

For the quantitative content analysis, we assessed the absolute and relative frequency of the codes across all three data sources. The assessment of the relative frequency is based on the relevant structural elements of the respective document (e.g. in the case of EXAM: the number of questions receiving an SDH-code).

The qualitative analysis of the EXAM and GK2 assessed which SDH-related topics are covered for each code and how SDH are represented in the text. Two to three authors conducted a thematic analysis of the content and context of the coded passages through paraphrasing followed by generalizing and reducing the content of each coded section and combining passages with similar content into topics. After assessing all coded passages, we discussed data saturation and assumed it to be reached.

As this study is based on the analysis of existing, publicly available data (except for IMPP exams), which does not contain personal or otherwise sensitive information, we do not expect any harm for individuals or patients arising from the conduct of our study.

Results

General

In total, we coded n=893 passages across the three document types with at least one of the 12 codes. Examples for such passages containing a reference to SDH are provided in table 1 & 2 in the appendix. By far, most passages were coded in the NKLM (n=716), followed by the EXAM (n=117) and the GK2 (n=60), which also reflects the length of the documents.

Most often, we applied the code *Universal health coverage* (n=272), followed by *SDH in general* (n=190) and *Early childhood development* (n=164). Across all documents, we did not identify any passage applicable for the codes *Political empowerment* or *Role of markets*. The code *Global governance* was only applied in the NKLM (n=2), as was the code *Health in all policies* (n=7).

The absolute number of codes applied over all three document groups as well as within each document group is displayed in figure 2. The distribution of codes applied varied considerably across the three documents, which is displayed in figure 1 and figure 2.

Figure 2 displays the distribution of codes relative to the length of the document.

EXAM

Out of all (n= 640) questions, we applied at least one code to 14% of all questions (n=88) and out of all (n=24) case studies 38% (n=9) had at least one passage with a reference to SDH. We considered 4% (n=4) of all coded questions and none of the coded case studies to have an explicit reference to SDH. We coded 3% (n=3) of the coded questions, <1% of all questions and none of the case studies in the exams with *Socioeconomic status & health*.

GK2

Of all analysed passages (n=572) 3% (n=20) were coded with at least one code. Out of all coded passages 5% (n=1) were considered to have an explicit reference to SDH. None of the coded passages in the GK2 met the criteria for the auxiliary code *Socioeconomic status & health*.

NKLM

Out of all (n=112) competencies, 28% (n=31) were coded with at least one code and 19% (n=54) out of all sub-competencies (n=279). Of all coded passages across the three levels we considered 21% (n=84) as explicit and we identified 5% (n=21) passages meeting the criteria for *Socioeconomic status & health.* While these are relatively few mentions contrasted with the length of the NKLM, some of them were very explicit. Such as: "12.20.2.2 [The medical student] is able to explain the relationship between social inequality and health and disease"[20].

Qualitative analysis – the most common SDH topics

In table 1 & 2 (see appendix), containing all codes as well as exemplary passages, we provide an overview over the most common topics within the four most frequent codes of the EXAM and GK2, which were: *Employment & work, Universal health coverage, Early childhood development* and *SDH in general*. For instance, in the EXAM, passages referring to the SDH code *Employment & work* mostly addressed exposure to health related risk factors at the workplace (57 %), followed by the impact of disease on the ability to work (20%), occupational accidents and diseases (17%), and the impact of the workplace on mental health (6%). Passages in the EXAM coded with *Universal health coverage* most often referred to public health preventive measures and surveillance (22%), the availability and accessibility to preventive-, rehabilitation- and nursing services (19%) and medical guidelines in the context of quality assurance (19%). The passages coded with *Early childhood development* mostly contained references to the physical and psychological development of children and adolescents (42%), the social, educational and language development of children and adolescents (17%) or referred to prevention of development disorders through vaccination (17%).

Discussion

Summary

In this quantitative and qualitative content analysis, we assessed the extent to which SDH are currently represented in key documents outlining, defining and guiding medical education in Germany. We found that SDH are represented to a limited extent with considerable differences across document type and SDH aspect. The range of SDH-representation ranged from 27% out of all competencies in the NKLM to merely 4% in the GK2. Our analysis found a pronounced heterogeneity among the SDH-aspects: While some

aspects of SDH, such as early childhood development and occupational health are well represented, the analysis reveals substantial gaps of SDH-aspects as well as within the codes applied. References e.g. to a health-in-all-policies approach or non-discrimination (including gender sensitivity) in regard to access to health, are currently hardly or non-represented. Only a fraction of references were explicit or addressed the relation between socioeconomic status and health.

While the strong representation of the codes *Early childhood development*, *Employment & work* and *Universal Health Coverage* is to be welcomed, one has to be aware that these high scores reflect methodological approaches and decisions, in particular our inclusive definition of SDH-domains:

As chapter 3 in the report of the WHO Commission on SDH focuses on the importance of (early) childhood development for social, economic and health outcomes in later life, we reflected this in our coding guideline as well: Most references to early childhood development focused on physiological and pathological development patterns of children or the long term preventive effect of vaccinations. While "a good start in life"[1] is an important determinant for individual development, one could question the classification of developmental disorders as a SDH if the focus is purely on biomedical reasons for development deficits without referring to important social and economic determinants of childhood development; for example are health consequences of childhood poverty, disorders resulting from preventable harmful behaviours or events during pregnancy or the influence of a child's physical, social or family environment not or hardly addressed.

With occupational medicine being part of the medical curriculum, *Employment & work* was the SDH-code most often used in the EXAM. The focuses of the coded passages were

symptoms and diagnosis of occupation related diseases and accidents as well as workplace related hazards. However, issues of employment, such as the interaction between health behavior and (long-term) unemployment, the social and health consequences of informal and precarious employment, or forced labor were not addressed in the GK2 or EXAM. Similarly, the strong representation of *Universal health coverage* in the NKLM is mostly based on a broad representation of evidence-based medicine issues, references to institutions of the health care system, medical confidentiality and hygiene as part of the medical practice. While these issues are highly important, relevant omissions regarding *Universal health coverage* in the GK2 and the EXAM include highlighting or addressing issues of accessibility, acceptability, non-discrimination of health care services as well as sufficient medical and scientific quality of health services.

Important omissions

Three codes could not at all or only rarely be applied in all three documents: *Role of markets, Political empowerment* and *Global governance*. One reason could be the complexity of the concepts, which makes their operationalization challenging. Furthermore, one could argue, that these issues are not relevant for physicians as knowledge and skills and these domains do not support the health professional in the treatment of and interaction with individual patients, and are therefore rightfully omitted. By contrast, the NKLM defines seven key professional roles a physician should fulfil in the health care system; of which one is the professional role of health advocate[20]. In order to improve the health of individuals as well as patient groups and populations, medical students should be trained to inter alia interact and collaborate with other health professionals, institutions and organizations of the health care system in the interests of patients and the general public. In order to fulfill this professional role, a differentiated knowledge about the broad social,

political and economic determinants affecting the health of patients is important[1-5,21], even if those go beyond the sphere of individual medical practice in patient health care. This includes knowledge of global health institutions and governance, the influence of trade and markets in shaping behaviours and environments as well as of political deprivation and participation as political determinants of societal wellbeing as those are the forces and systems carving out the conditions of daily life in which people are born, grow, work, live, and age. Physicians in the role of health advocates can thereby contribute to the health-in-all-policies approach as well as to universal health coverage and the 2030-Agenda for Sustainable Development[22-24].

Explicity of SDH references

Moreover, an additional important omission revealed in our analysis is the limited number of explicit references to SDH and a lack of attention to the importance of socioeconomic status and health as well as health inequalities – both at the centre of the concept of SDH: Only 13% of all coded passages contained an explicit reference to SDH. While the NKLM has the highest rate of explicit references (20% of coded; 3% of total), the rate of general and explicit references drops when it comes to the actual state examination questions. This is important, as the NKLM is a not a legally binding document, but aimed to guide medical faculties in the development of their curriculum. The EXAM and the GK2 form the basis on which the performance of medical students is judged on and they therefore mainly prepare for.

Social accountability of medical schools

Addressing SDH is one of the building blocks of a socially accountable medical education. In discussing how medical schools meet their social obligation, three steps can be distinguished: social responsibility, social responsiveness and social accountability[15]. Using

SDH as an example, responsibility refers to an implicit consideration, e.g. through courses on SDH and their impact; responsiveness would incorporate community-based activities and ensure an adequate distribution of graduates to address inequities; lastly, accountability represents the most advanced step, with societal needs at the core of decision-making and agenda-setting of medical schools.

Our study can only help assess the first of these steps and answer whether German medical education as a whole is socially responsible. The results outlined above show that social responsibility with respect to SDH is still poor. We do acknowledge that some medical schools offer (optional) modules that could be characterised as socially responsive. Despite notable exceptions, it is questionable how medical schools on the whole can advance to social responsiveness if the national frameworks guiding their curricula do not reflect their social responsibility.

Strengths and limitations

Our study has several strengths. Our analysis is based on a pre-developed and peer-reviewed study protocol [18]. The methodology to assess the way and extent to which a topic is covered in the German medical education could be adapted to other related questions and document groups (e.g. to assess the individual curricula of all medical schools in Germany). The results provide valuable insights into the current role of SDH in the medical curriculum in Germany. Because of their normative role, they also pose significant levers when intending to increase the role of SDH in the future[18].

Our study also has limitations. For capacity reasons we were not able to conduct the analysis of four document groups, as outlined in our study protocol, but had to focus within the quantitative analysis on three and within the qualitative analysis on two document groups. Our analysis does not cover the curricula of individual medical schools, locally

developed learning materials or electives, which are often developed and run locally by committed students and teachers[25-27]. Moreover, we did not discuss how a medical curriculum covering all important aspects of SDH could be developed in practice and if the applied 12 codes are sufficient to cover the broad spectrum of SDH.

Conclusion

Based on the findings of our study, we suggest the following approaches to strengthen SDH in medical curricula. (1) Closing the gaps. Medical curricula should not focus on single aspects of SDH but aim to encompass the broad spectrum of SDH with relevance for the future health workforce. In order to increase awareness for how SDH shape the health and wellbeing of patients, (2) SDH need to be addressed more explicitly. In particular, there needs to be (3) more emphasis on the interconnectedness of social status and social stratification with the health status of populations and individuals as well as on the issue of health inequalities within and between societies. In our study for instance, many questions in the EXAM include a general introduction. Using these passages to (4) frame and contextualize questions with regard to the social reality people are born in, grow, live, and age could be a simple approach to strengthen SDH. With SDH being at the centre of public health (5), strengthening population health aspects in the medical curriculum in Germany is warranted. Greater cultural change within medical schools is needed to achieve true social accountability (6) as conceptualised in the Global Consensus on Social Accountability (2010). Education on SDH can (7) strengthen interdisciplinary learning, curriculum development, teaching, and practice.) The results, in combination with similar studies, should serve as a basis to develop a SDH-framework for medical curricula (8), which serves as a benchmark for all medical schools.

This study fills a knowledge gap on the role of SDH in German medical education. It provides insights for an evidence-informed approach to strengthen the representation of SDH with the aim to better prepare health care professionals for current and future public and global health challenges.

***Figure 1: Relative distribution of applied codes**. The figure shows the relative number of the twelve applied codes and their distribution across the exams, the GK-2, the NKLM. Relative refers in this case to the share of each code out of all codes applied to the specific document groups (EXAM, GK-2, NKLM) as well as to the share of all codes applied across the three documents. (SDH = Social Determinants of Health; ECD = Early childhood development; UHC = Universal Health Coverage.)*

***Figure 2: Number of elements across the documents containing an explicit or non-explicit reference to social determinants of health**. The figure shows the distribution of elements across each of the three document types containing an explicit or non-explicit reference to social determinants of health relative to the total number of elements contained in the document.*

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Ethical approval

As the study is based on an analysis of secondary data which is for the most part publicly available, the risk associated with the study and its outcomes was considered neglectable, and as the study did not involve human subjects, no IRB approval was needed.

Competing interest statements

The authors KG and SD are involved in the revision process of the NKLM. The bvmd is involved in the revision process of the NKLM as well.

Author contribution:

FH and PvP conceived the study. FH and JMS developed the coding frame and FH, KG, PvP, SD, and JMS pilot tested it on a sample of documents. The coding of the documents was conducted by FH, SD and JMS. The analysis was conducted by FH, KG, PvP, SD, and JMS. FH and JMS drafted the manuscript with support from PvP, SD and KG. FH obtained the primary data.

Data sharing statement: The NKLM and GK2 are publicly available. The IMPP questions can be received from the IMPP upon request. We provide the coding frame of the document as a supplement. Additional documents can be provided upon request.

Code / document	IMPP	GK-2	NKLM	Total
1. SDH in general	11%	7%	24%	21%
2. ECD	18%	50%	16%	18%
3. Living conditions	14%	15%	6%	8%
4. Employment & work	29%	15%	5%	9%
5. Social protection	8%	0%	4%	4%
6. UHC	17%	13%	34%	30%
7. Health in all policies	0%	0%	1%	1%
8. Financing of social services	3%	0%	2%	2%
9. Role of markets	0%	0%	0%	0%
10. Non-discrimination	0%	0%	7%	5%
11. Political empowerment	0%	0%	0%	0%
12. Global governance	0%	0%	0%	0%

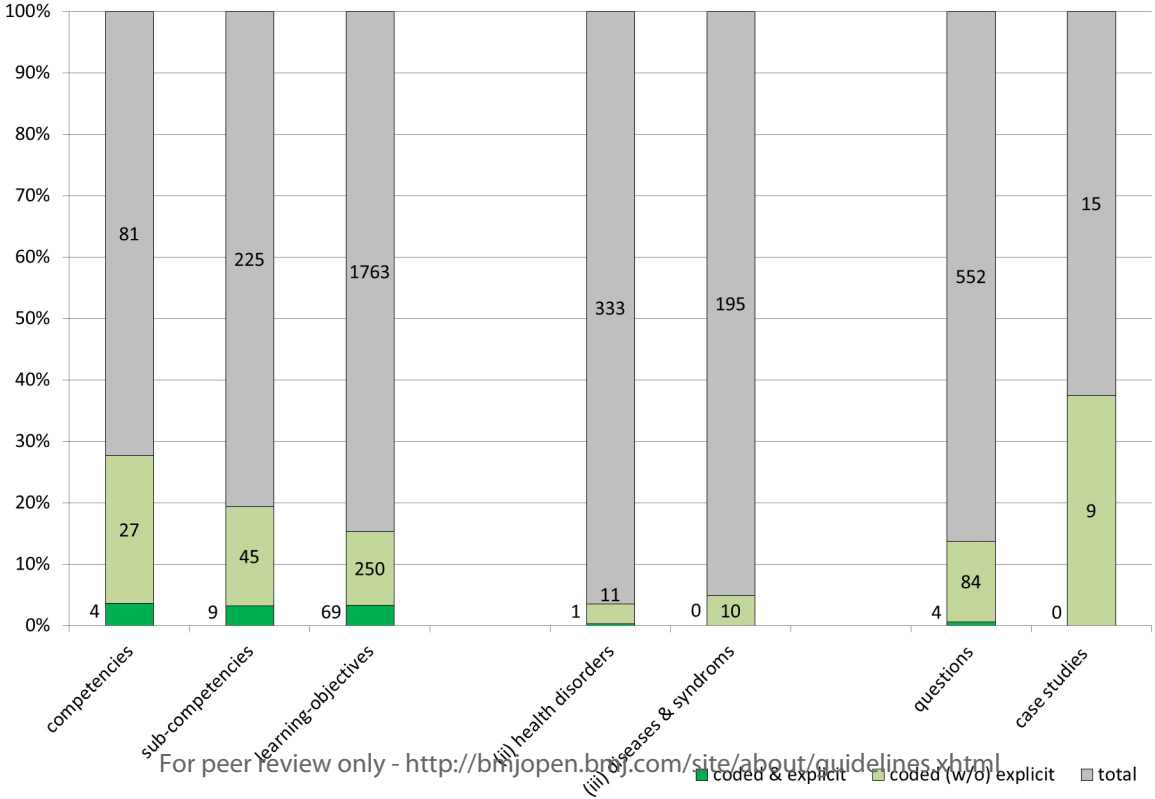

Table 1: Overview over qualitative analysis of coded passages in EXAM. The table displays the results of the detailed analysis of the segments coded in the document types EXAM. Each passage was assigned a label or short description ("distinct aspects"), which were summarized to topics represented within each code. An example is provided for each topic.

Code 4: Employment and work (29% of all codes; n=35 distinct aspects within code)			
Topics	**[%] of topic in the code**	**Distinct Aspects**	**Example**
Exposure to health related risk factors at the workplace (biological, physical, chemical, ergonomic and psychosocial hazards)	57%	Reference to exposure to health related risk factors in the workplace (vector-borne diseases)	"A 25 year old male is employed in a supplier of the automobile industry. His occupation primarily consists of the manufacturing of parts made out of foamed material and the tailoring of rigid foam plates. He also spray coats metal parts with synthetic material. Now, the patients suffers from an irritation of the throat, a sensation of retrosternal pressure and tightness of the chest, as well as a shortness of breath similar to asthma with dry, wheezing and whistling breathing noises. In each case, these symptoms occur about one hour after the start of work. Which occupational cause is most likely?"
		Reference to exposure to health related risk factors in the workplace (restricted mobility)	
		Reference to exposure to factors, which might worse existing diseases (heat, cold)	
		Reference to exposure to health related risk factors at workplace (chemical substances, industrial processing)	
		Reference to exposure to health related risk factors in the workplace (chemical substances, industrial processing)	
		Reference to exposure to health related risk factors at workplace (infectious patients in hospitals)	
		Reference to exposure to health related risk factors in the workplace (infectious patients in hospitals)	
		Reference to exposure to health related risk factors in the workplace (chemical substances, industrial processing)	
		Reference to exposure to health related risk factors in the workplace (chemical substances)	
		Reference to exposure to physical health related risk factors at workplace (UV-radiation)	
		Reference to exposure to health related risk factors in the workplace (infectious patients in hospitals)	
		Reference to exposure to health related risk factors in the workplace (chemical substances, industrial processing)	
		Reference to exposure to health related risk factors in the workplace (physical factors, vibration)	
		Reference to exposure to health related risk factors in the workplace (chemical substances, industrial processing)	
		Reference to exposure to chemical and physical health related risk factors in the workplace	
		Reference to exposure to chemical and physical health related risk factors in the	

		workplace	
		Reference to exposure to health related risk factors in the workplace (particle, fine dust)	
		Reference to exposure to health related risk factors in the workplace (particle, fine dust)	
		Reference to exposition against health related risk factors in the workplace (particle, fine dust)	
		Relation to occupational factors, which increase the likelihood for risk behavior	
Occupational accidents and diseases	17%	Reference to occupational accident	A 72-year old former miner states that he has lost about 5kg of body weight in the past 3 months. He feels weak and drained and suffers from profuse sweating. He increasingly suffers from chesty coughs; yesterday he noticed blood in his sputum. You arrange a chest x-ray and detect a pea-sized opacity in the right hemi thorax with a connected wedge-shaped clouded area. You diagnose a bronchial carcinoma which is verified using bronchoscopy and cytology. As you suspect a link to the former occupation as a miner, you report the substantiated suspicion of an occupational illness.
		Reference to occupational accident	
		Reference to deadly occupational accident	
		Reference to impact of the workplace on health status; causing of occupational illness	
		Reference to impact of the workplace on health status; causing of occupational illness	
		Reference to impact of performed profession on health	
Impact of disease on the ability to work	20%	Reference to resumption of work after infectious disease, which has constituted a potential public health risk	You treat a 54-year old metal worker's gonarthrosis. He believes that he is not able to continue his occupational activity, which is performed while walking and standing and repeatedly involves lifting and carrying of weights of more than 10 KGs.
		Reference to impact of disease on further occupation	
		Reference to impact of pain on ability to work	
		Reference to impact on disease on possibilities for professional training career	
		Reference to impact of disease on ability to work	
		Reference to impact of disease on ability to work	
		Reference to impact of disease on ability to work	
Impact of workplace on mental health	6%	Reference to impact of job loss on mental health	Ms. H reports to have suffered from depression for several years. She reports that she therefore cannot work anymore and is on sick leave. She states that the cause of her depression are difficult working conditions, including mobbing.
		Reference to impact of workplace on mental health (mobbing)	

Code 6: Universal Health Coverage (17% of all codes; n=32 distinct aspects within code)			
Topics	**[%] of topic in the code**	**Distinct Aspects**	**Example**
Legal guardian system	3%	Reference to legal guardian system (Representation by another person in case of loss of personal power of judgement in case of disease)	[...] Mrs. P. therefore intends to enable Mr. K. to represent her in the future in matters of health care, if and as long as she is unable to take care of her own affairs in the field of health; he should decide under these conditions as her representative, for example, in terms of health checks, with regard to medical treatment or medical interventions.
Public health preventive measures and surveillance	22%	Reference to vaccination recommendation by STIKO	During an EHEC outbreak in a city, the incidence of diarrhea cases in a school increases and EHEC is detected. An investigation by the health authority reveals that 27 out of 30 students who regularly receive lunch at school were found to have infection or colonization with EHEC.
		Reference to vaccination recommendation by STIKO	
		Reference to surveillance measures by public health authorities	
		Reference to institutional framework of civil protection	
		Reference to infection protection law	
		Civil protection to prevent the spread of infectious diseases	
		Reference to screening of potential infections	
Company physicians as institution	9%	Reference to institution of company physicians	You are a company doctor at a large municipal company. One aspect of your occupation is to provide occupational health care services to gardening and landscaping professionals.
		Reference to screening measures of occupational health	
		Reference to legal framework of occupational safety	
Availability and accessibility of preventive-, rehabilitation- and nursing services	19%	Reference to rehabilitation measures	Your general practice is in a deprived area, a "social hotspot". Many of your patients are unemployed. In addition, you have an above-average number of citizens with a migrant background among your patients. Compared to the average population, you have higher proportion of smokers among patients visiting your practice. As a result, many of your patients suffer from chronic obstructive pulmonary disease (COPD). Only treating individual patients symptomatically is not enough for you. You therefore plan to intensify your preventive efforts to reduce COPD among your patients. Which of the following statements on prevention are most likely to be correct?
		Reference to rehabilitation measures	
		Reference to established medical screening measures	
		Reference to private complementary insurance to cover a rehabilitation program	
		Reference to availability of outpatient nursing service	
		Access to preventive programs	

Medical confidentiality	9%	Reference to medical confidentiality	[...] The ophthalmologist of Mr. K states strongly that his state of health prohibits him from driving a motor vehicle and gives comprehensive explanations of why this is the case. The ophthalmologist carefully documents her warnings and explanations in the medical records. However, the patient proves to be impervious to advice and despite all the coaxing he again and again drives his car on public roads. Thereby, he poses a permanent danger. In misjudgment of his situation, Mr. K. repeatedly states that he is still coping with driving "really well". He has had "the car driver's license" for decades and still enjoys driving. Hence, he wants to have the opportunity to to use the care whenever he wants to do so. [He states that] fortunately, his wife does not know about the state of his eyesight. After the many futile efforts to keep Mr K. from driving his motor vehicle, the ophthalmologist is considering revealing her patient's inability to drive to the responsible administrative authority for the elimination of hazards. The doctor wonders if she herself has done everything that must or should precede any communication to the authority. Which of the following measures is most appropriate for the ophthalmologist to do before the eventual disclosure of Mr. K's ineptitude?
		Reference to medical confidentiality	
		Reference to medical confidentiality	
Medical guidelines in the context of quality assurance	19%	Reference to national disease management in the context of quality assurance	You care for a 43-year-old female patient with acute-onset low back pain. You consider arranging an x-ray examination for the patient and find a national Disease Management Guideline for this condition on the internet. According to the guideline, no imaging should be performed in acute low back pain if a serious course has been ruled out clinically.
		Reference to vaccination recommendations of STIKO	
		Reference to guidelines in the context of recognizing occupational illnesses	
		Reference to vaccination recommendations of STIKO	
		Reference to WHO guideline for hand hygiene in the health sector	
		Reference to guideline in context of evidence-based-medicine and institutional structures	
Hygiene in the health sector	19%	Reference to hand hygiene of medical personnel	In 2009, the WHO issued a guideline on hand hygiene in healthcare sector, the content of which has been widely adopted in national guidelines and recommendations as well as in the "Clean Hands" campaign. Which statement on hygienic behavior is most likely correct in the situation described above?
		Reference to hygiene measures in direct contact with patients	
		Reference to measures within the health sector in case of handling infectious patients	
		Reference to hygiene measures in case of infectiousness	
		Reference to measures within the health sector in case of handling infectious patients	
		Reference to security in individual treatment of patients	

Code 2: Early Childhood Development and Education (18% of all codes; n=24 distinct aspects within code)			
Topics	**[%] of topic in the code**	**Distinct Aspects**	**Example**
Physical and psychological development of children and adolescents	42%	Reference to sexual development	[...] Felix's mother is informed of the verified diagnosis of celiac disease and Helicobacter pylori-associated gastritis [of her child]. She is furthermore informed of the necessary therapeutic measures, in particular the special celiac diet. Following the recommendations, the symptoms quickly improve. A follow-up examination shows that Felix has gained a lot of weight. The celiac antibodies are almost within the normal range, so that these laboratory parameters indicate a good compliance with the special celiac diet
		Reference to impact of disease in childhood on further development (including adulthood)	
		Reference to impact of disease in childhood on mobility behavior	
		Reference to failure to thrive	
		Reference to failure to thrive	
		Impact of perinatal infection on health and physical development	
		Reference to impact of a genetic syndrome on health, physical and sexual development	
		Reference to necessity of dietary measures in the context of the impact of a special diet on child development	
		Reference to monitoring of childhood development	
		Impact of chronical diseases on childhood development	
Social, educational and language development of children and adolescents	17%	Reference to language development of children	Paul, 8 years old, presents as an outpatient in the company of his mother. His performance in the third grade of elementary school is inadequate, in "working and social behavior" he has a grade of 4 [equivalent to D in the US grading system]. His mother describes Paul as very impatient and impulsive. In class, he stands out for his distracting comments, for running around, and for frequent chatting with other children. He quickly engages in physical conflicts with his classmates, often feels criticized quickly and reacts in a very sensitive manner. In class, he is easily distracted; his work style is impulsive and faulty. Mostly, he returns his class test first and does so far too early. Even though his teacher and his parents are convinced that the child is able to do basic arithmetic and knows the spelling rules, he makes a lot of mistakes, because he does not read the task at hand properly and "just starts out with doing something which is why his answers are often wrong. The situation has deteriorated recently, with increased frustration leading to more rapid aggressive reactions, refusal to participate in school and to massively disturbing the class. Several meetings have taken place in the school [to discuss his case]. The mother states, that if his behavior
		Reference to influence of chronic diseases on mental development, in particular school degree	

		Impact of disease on school development and social participation of children and adolescents	continues he may be expelled from school. There are no difficult familial problems at the moment (except those as a result of the above-mentioned difficulties). [...]. Extensive diagnostics conclude average intellectual performance with a heterogeneous performance profile. The parent and teacher questionnaires reveal significant issues of attention and concentration, motor restlessness, and impulsivity.
		Reference to social effects (behavioral disorders) in case of non-treatment of a chronic disease	
Negative impact of parental care on children	4%	Negative impact of maternal ideology on health of the child	A mother presents her two-year-old boy at the pediatrician's office, because she is worried about his physical development. The following is noted during the physical exam: distensions at the osteochondral borders at the wrist and the ribs, a bell-shaped deformation of the thorax, an open fontanelle, a failure to thrive, muscular hypotonia and delayed development of the teeth. The child is only feed using breast milk and the mother is vegan. Any form of supplementation with vitamins / dietary minerals is opposed by the mother for ideological reasons, both for herself and the child. What are the findings most likely to be attributable to? (A) Vitamin B12 deficiency ; (B) Vitamin D deficiency ; (C) Hypothyroidism (D) Vitamin E deficiency ; (E) Zinc deficiency
Child abuse	8%	Reference to child abuse	A mother presents her 5-year-old boy at the pediatrician's office. He has earache and a fever. The pediatrician's examination leads to the diagnosis "acute otitis media with effusion". Additionally, the pediatrician notices two double streaks on the back during the examination. These are two, doubled-streaked, reddish signs of bleeding of 8 and 10 cm in length, respectively, both double streaked blood extravagates run in parallel with a distance of about 0.5 cm to each other; the skin between the reddish streaks of the respective double streaks seems pale. One of the two double streaks is on the right, the other on the left side of the back, each on the level of the shoulder blade and almost oriented horizontally. Apart from the double-streak-shaped signs of trauma (each with blanching), there are no other signs of violent physical damage. According to the laboratory report, the child has no blood coagulation disorders.
		Reference to child abuse	
Screening and preventive measures	13%	Reference to neonatal medical screening	
		Reference to neonatal medical screening	
		Reference to medical screening of children	
Prevention of development disorders through vaccination	17%	Reference to vaccination	Melanie received the STIKO-recommended vaccinations on schedule.
		Reference to vaccination	
		Reference to vaccination status	
		Reference to vaccination status	

Code 1: SDH in general (11% of all codes; n=20 distinct aspects within code)			
Topics	**[%] of topic in the code**	**Distinct Aspects**	**Example**
Impact of illness on social participation, individual way of living and social environment	65%	Indirect: Impact of illness on independence in everyday life / individual way of living	Ms. H. reports that she has been suffering from memory impairment for 6 months and has had to write down almost everything. She claims to misplace things and to forget about intended actions. Additionally, she claims to be disoriented with regard to location. She reports being comfortable in her familiar environment, but unable to make her way back from the city to her home using public transit unaccompanied. In addition, she mentions a difficulty to find words and that her husband noticed the increased use of filler words. He adds, that the symptoms have been developing over a long time, at least in the past one and a half years. He also reports a pronounced 'perception disorder', with his wife overlooking things. For example, in larger groups of persons she fails to notice known persons and thus does not greet them. He states that she is unable to play card games, as the amount of cards overwhelms her. Overall, she is not able to cope with daily activities without his help. Ms. H. states that she has been suffering from a depression for several years, because of which she has not been working and has been certified to be unfit for work for one and a half years.
		Impact of illness on independence in everyday life / individual way of living	
		Impact of illness on independence in everyday life / individual way of living	
		Negative impact of illness on leisure activities / hobbies	
		Negative impact of illness on leisure activities / hobbies	
		Impact of illness on social participation	
		Direct: Knowledge of index for assessing basic daily functions	
		Impact of illness on social participation	
		Negative impact of illness on social functions	
		Negative impact of illness on family environment	
		Impact of illness on desire to have children	
		Impact of illness on public health (road safety)	
		Negative impact of illness on mental health of relatives	
Impact of the social environment on health Einfluss des sozialen Umfelds auf die Gesundheit	5%	Social networks and relationships as predictor of illness	Near the end of the inpatient treatment of Mr K., he asks about the long term prognosis of his schizophrenic psychosis. During the conversation, the attending physician pointed to the general difficulty of a reliable early prognosis in an individual case. Taking statistical aspects into consideration, meaning prognostic trends, several predictors of the course and outcome of schizophrenia can be named, though. From this general perspective, predictors for a favorable or good prognosis can be differentiated from those that point to an unfavorable or poor prognosis. The trend is predictively favorable for a short 'duration of untreated psychosis' (DUP). Which of the following factors is on the contrary primarily counted as an unfavorable predictor of schizophrenia? (A) acute onset of disease; (B) Premorbid personality: Outgoing, extroverted (C) gradual onset of disease with negative symptoms; (D) Married status of the diseased person; (E) female sex of the diseased person

Wellbeing and quality of life in the context of mental health	10%	Impact of illness on mental health and wellbeing	A 18-year-old patient presents with the following behavioral disorders: He reports throwing his head to the left at irregular intervals while uttering grunting sounds, or grabbing clothing at the collar with his right hand and pulling it up in a fierce movement. These involuntary movements which he can hardly suppress started at the age of 16. First, they were discrete and he tried to hide them by pretending that they were deliberate. Over time, this became increasingly difficult. The grunting started about one year later. Because his conduct was met with incomprehension, he withdrew from social interactions which harmed his vocational training and his mood substantially.
		Impact of illness on mental health and wellbeing	
Health in the context of socioeconomic status	5%	Impact of socioeconomic status on the burden of disease of a population	Your general practice is in a deprived area, a "social hotspot". Many of your patients are unemployed. In addition, you have an above-average number of citizens with a migrant background among your patients. Compared to the average population, you have higher proportion of smokers among patients visiting your practice. As a result, many of your patients suffer from chronic obstructive pulmonary disease (COPD).
Impact of ideology on utilisation of medical measures	15%	Impact of ideology on utilization of medical measures	Any form of supplementation with vitamins / dietary minerals is opposed by the mother for ideological reasons, both for herself and the child.
		Impact of ideology on utilization of medical measures	
		Negative impact of maternal ideology on health of the child	

Code 3: Living conditions (14% of all codes; n=16 distinct aspects within code)			
Topics	**[%] of topic in the code**	**Distinct Aspects**	**Example**
Violence in the immediate environment (home environment, school)	13%	Reference to domestic violence	The 22-year-old Ms. Yvonne W. arrives in a forensic outpatient clinic accompanied by her mother. She reports that she was strangled by her former boyfriend about three hours ago. Following this "violence against the neck", Ms. W. has difficulty swallowing and her voice sounds hoarse. Se states that the choking had made her black out and lose consciousness for a short time.
		Reference to violence at school, within peer groups	
Exposure to health risk factors in the immediate environment (zoonosis, disease transmission by vector, hygiene, food hygiene, ultraviolet radiation)	88%	Reference to exposure to health risk factors in the immediate environment (disease transmission by vector)	[...] Mr. T states that he cannot remember with certainty to have had contact with ticks, but reports having spent a lot of time outdoors in the US over the course of his occupation and to have had stings followed by a reddening of the skin repeatedly. [...] In endemic areas, various measures for the prevention of tick-borne Borrelia infections are available [...] H2016
		Reference to exposure to health risk factors in the immediate environment (hygiene, food hygiene)	
		Reference to exposure to health risk factors in the immediate environment (disease transmission by vector)	
		Reference to exposure to health risk factors in the immediate environment (hygiene, food hygiene)	
		Reference to exposure to health risk factors in the immediate environment (hygiene)	
		Reference to exposure to health risk factors in the immediate environment (zoonosis)	
		Reference to exposure to health risk factors in the immediate environment (zoonosis)	
		Reference to exposure to health risk factors in the immediate environment (zoonosis)	
		Reference to exposure to health risk factors in the immediate environment (disease transmission by vector)	
		Reference to exposure to health risk factors in the immediate environment (disease transmission by vector)	
		Reference to exposure to health risk factors in the immediate environment (disease transmission by vector)	
		Reference to exposure to health risk factors in the immediate environment (disease transmission by vector)	
		Reference to exposure to health risk factors in the immediate environment (disease transmission by vector)	
		Reference to physical environmental factors (Ultraviolet radiation triggering illness)	

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Code 5: Social protection (8% of all codes; n=13 distinct aspects within code)			
Topics	**[%] of topic in the code**	**Distinct Aspects**	**Example**
Occupational diseases in the context of social security	54%	- Reference to the existence of the concept of occupational diseases	
		- Reference to conditions for recognition as an occupational disease	
		- Reference to conditions for recognition as an occupational disease	"As you suspect a link between the illness and the former occupation as a miner, you report the substantiated suspicion of an occupational illness. The employers' liability insurance association informs you that the investigation resulted in a total of 230 WLM (working level months)."
		- Reference to conditions for recognition as an occupational disease	
		- Reference to conditions for recognition as an occupational disease	
		- Reference to financial compensation after recognition as an occupational disease	
		- Reference to financial compensation after recognition as an occupational disease	
Social protection in the context of inability to work	46%	- Reference to the possibility and prerequisites for recognition of health restrictions by an official disabled person's pass and the responsible institution	
		- Reference to the possibility of recognition of health restrictions by an official disabled person's card and the responsible institution	
		- Reference to legal framework conditions for recognition of incapacity for work or reduced earning capacity	For some years now, the 55-year-old secretary Ulrike K. is in the care of your practice because of her bilateral osteoarthritis. The osteoarthritis increasingly causes her difficulty walking. Ms K. is considering to have herself issued an official certificate of severe disability ('disabled person's pass'). She now turns to you to learn what conditions must be met and to learn where she can apply for this card.
		- Reference to criteria for recognition of the degree of reduction in earning capacity in the case of occupational disease	
		- Reference to accident insurance institution	
		- Reference to accident insurance institution	

Code 7: Health in all policies (<1% of all codes; n=2 distinct aspects within code)			
Topics	**[%] of topic in the code**	**Distinct Aspects**	**Example**
Health system and inner security	100%	- Reference to cooperation with safety authorities	
		- Reference to law for reduction of violence	
Code 8: Health financing (3% of all codes; n=8 distinct aspects within code)			
Topics	**[%] of topic in the code**	**Distinct Aspects**	**Example**
Financial accessibility of the health system	38%	- Relation to reimbursement of medical costs	The patient is desparate and entrusts himself to the physician by truthfully describing the robbery during the necessary medical treatment of his wounds; Mr B. asserts that he will never again commit such wrongdoing; he claims to have thrown his illegal gun into a canal; he does not want to surrender to the policy, though, as he has to support his family through 'honest' occasional jobs. Which of the following situational judgments is lawfully correct in the context of medical confidentiality?
		Reference to financing of rehabilitation measures	
		- Relation to individual health services which are beyond services covered of the health insurance system (“IGeL-Leistungen”)	A 62-year-old male gets his prostate-specific antigen in the serum checked as an 'individual health service' at his general practitioner's office because his father fell ill with a metastasised prostate carcinoma and he fears a genetic predisposition.
Financing of the health system	63%	- Reference to the solidarity principle in the contribution structure of statutory health insurance	
		- Relation to risk structure compensation	
		- Reference to medical billing system	You feel encouraged to inform M. E. about the solidarity principe in the social health insurance, of which he is a voluntary member. Which statement about the solidarity principle of the social health insurance is least accurate?
		- Reference to medical billing system	
		- Reference to the Medical Service of the Health Insurance Funds (“Medizinischer Dienst der Krankenkassen”)	

Code 9: Role of markets (0% of all codes; n=0 distinct aspects within code)
/
Code 10: Non-discrimination (0% of all codes; n=0 distinct aspects within code)
/
Code 11: Political Empowerment (0% of all codes; n=0 distinct aspects within code)
/
Code 12: Global Governance (0% of all codes; n=0 distinct aspects within code)
/

Table 2: Overview over qualitative analysis of coded passages in the GK-2. The table displays the results of the detailed analysis of the segments coded in the document types EXAM and GK-2. Each passage was assigned a label or short description ("distinct aspects"), which were summarized to topics represented within each code.

Code 2: Early Childhood Development and Education (50% of all codes; n=25 distinct aspects)		
Topics	[%] of topic in the code	Distinct aspects
Medical screening measures	8%	Reference to screening measures of children
		Reference to prenatal care
Child abuse	4%	Keyword child abuse
Physical and mental; social, school and language development of children and adolescents	88%	Mentioning of childhood development disorders
		N=13 reference to development disorders
		Reference to development disorders, reference to education
		Reference to development disorders in a social context
		N=3 Reference to intrauterine development disorders
		Reference to intrauterine and early childhood development disorders
		N=2 Reference to education
Code 3: Living conditions (15% of all codes, n=5 distinct aspects)		
Health related risk factors in the physical environment	40%	Reference to lung diseases caused by influences of the physical environment
		Reference to lung diseases caused by influences of the physical environment; probable reference to occupational diseases
Violence	20%	Reference to violence
Hygiene	40%	Reference to hygiene (in general, in hospitals, in public)
		Reference to food hygiene
Code 4: Employment and work (15% of all codes, n=4 distinct aspects)		
Exposition against health related risk factors at workplace	25%	Exposition against health related risk factors at workplace
Occupational diseases	75%	Reference to occupational diseases
		Reference to occupational diseases of the lung and airway
		Reference to heavy metal induced kidney diseases

Code 1: SDH in general (7% of all codes, n=7 distinct aspects)		
Topics	[%] of topic in the code	Distinct aspects
Legal and ethical aspects of abortion	29%	N=2 Reference to legal and ethical aspects of abortion
Social and psychosocial problems	43%	Keyword psychosocial problems
		N=2 Keyword problems in the social environment
Concept of Public Health	29%	Reference to non-health related impacts of diseases on on indvidual and population level
		Reference to social medicine, Public Health
Code 6: Universal health coverage (13% of all codes, n=5 distinct aspects)		
Occupational medical examinations	20%	Analysis of workplace and occupation rleated burdens and stresses.
Screening measures	20%	Reference to screening measures
Keywork disaster medicine	20%	Keyword diaster medicine
Hygiene in the health sector	40%	Reference to hygiene in hospitals
		Reference to hygiene (general, in hospitals, in public)

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Representation of social determinants of health in German medical education: protocol of a content analysis study

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ABSTRACT

Introduction Action on the social determinants of health has been key for improving health and prolonging life in the past, and remains so today. Against this background, WHO's Commission on Social Determinants of Health has called for increased efforts to create health workforces trained in recognising, understanding and acting on the social determinants of health. However, little is known about the extent to which current medical education systems prepare graduates for this challenge. We, therefore, aim to analyse the extent to which the medical curriculum in Germany incorporates content on the social determinants of health.

Methods and analysis We will conduct a qualitative and quantitative content analysis of four key document groups which influence medical education in Germany: the national medical catalogue of learning objectives; examination content outlines provided by the German Institute for Medical and Pharmaceutical Examination Questions; the online textbook most widely used for final examination preparation and the full set of questions from two national medical licensing examinations. We will analyse these documents based on a coding system, which we derived deductively from the report of WHO's Commission on Social Determinants of Health as well as other key publications of WHO. We will report quantitative indicators, such as the percentage of text related to social determinants of health for each document type. Moreover, we will conduct a semiqualitative analysis of relevant content.

Ethics and dissemination This study is based on the analysis of existing documents which do not contain personal or otherwise sensitive information. Results from the study will be published in a scientific peer-reviewed journal.

Strengths and limitations of this study

- The strength of this study is the comprehensive methodological approach developed for the analysis of medical education, which can be transferred to a variety of settings.
- The analysis will be based on codes derived from key, internationally recognised documents of WHO and will focus on a variety of documents representing content taught and assessed as part of medical education in Germany.
- The analysis is limited to the German medical education system.
- The analysis is limited to the national level. Therefore, curricula of individual universities will not be part of the analysis. The approach of content analysis of key documents is not able to capture the knowledge attained by individual students during their medical studies nor programmes provided by the individual universities which might exceed national expectations.

INTRODUCTION

Article 25 of the Universal Declaration of Human Rights affirms that '[e]veryone has the right to a standard of living adequate for the health and well-being of himself and of his family, including food, clothing, housing and medical care and necessary social services […].' This right to the highest attainable standard of physical and mental health is not confined to the right to healthcare. On the contrary, it acknowledges that the right to health embraces a wide range of socioeconomic factors that promote conditions in which people can lead a healthy life, and extends to the underlying determinants of health, such as food and nutrition, housing, access to safe water and adequate sanitation, safe and healthy working conditions, and a healthy environment. The health status of people on a population level is influenced by four crucial pillars: individual biological conditions, medical care, factors of individual behaviour as well as social determinants.[1] WHO has defined social determinants of health (SDH) as the conditions in which people are born, grow, live, and age and the wider set of forces and systems shaping the conditions of daily life.[2] There is robust evidence that among the four pillars mentioned above, SDH have the strongest and most far reaching impact on health on a population level,[3–6] and that the observed

inequality in health outcomes is to the largest part attributable to inequality in SDH.[7 8]

Against this background, the WHO Commission on Social Determinants of Health (CSDH) was established in 2005 with the aim to spread knowledge, awareness and acceptance about strategies related to SDH, as well as to integrate these into health policies on a long-term basis. In 2008, the Commission published its report, which emphasises the role of SDH by identifying social inequality as key source for health inequity. Moreover, it calls for action to close the existing social gap within a generation.[2] Social inequity has been widely identified as a main factor for differences in health status—between nations, as well as within nations.[2 9–11] The report is considered a key document regarding SDH in general and has been the basis for previous studies investigating the inclusion of SDH-related contents of medical education.[12]

One part of the Commission's report refers to training of medical and health professionals in terms of SDH.[2] It emphasises the responsibility, necessity and advantage of a broad understanding of SDH for health professionals and recommends that '[e]ducational institutions and relevant ministries make the [SDH] a standard and compulsory part of training of medical and health professionals.'[2] It stresses that to 'develop a workforce that is trained in the [SDH]' is a main principle of action for reducing inequalities in health.[2 13] Thus, recognising their paramount significance, SDH should be a mandatory subject matter for every medical student and not just an optional elective depending on individual engagement. In this way, medical schools could address their social accountability.[14]

Facing this international background, our study will analyse the role of SDH in medical education in Germany. As SDH are a cornerstone of social medicine, public and global health, they are frequently taught in these contexts. However, of these three subjects only social medicine and public health are compulsory parts of medical education in Germany.[15] Despite being a compulsory part of national medical education and assessment since the 1970s, social medicine still does not receive adequate attention at many medical faculties. Although the importance of global health education has been increasingly recognised,[16] implementation in Germany remains fragmentary, faces crucial barriers and still depends to a great extent on local commitment of individual teachers or students.[17–21] Study results from the late 1990s on the role of social medicine in German medical education investigating 32 curricula of medical schools document a substantial neglect of this subject.[22] There is, to our best knowledge, no indication that representation of SDH in medical education has significantly improved since then, nor has an in-depth study of the representation of SDH in medical education in Germany, considering current teaching and examination materials, been conducted.

RESEARCH AIMS AND QUESTIONS

The aim of this study is to assess how and to what extent SDH are represented in key documents that outline curriculum and assessment content in German medical education. To answer this research question, we aim to conduct an analysis of four key document groups, which influence medical education in Germany. In order to answer this overarching research question, we developed a number of subquestions, which are shown in the following. A first, quantitative level of analysis will focus on the absolute and relative frequency of the respective codes in each analysed document (see below) as well as across all documents. These research subquestions are:

- How many references are made in each document type to each SDH code (frequency)?
- How many per cent of the text of each document type refers to each SDH code (relative frequency)?
- How large is the overlap between the different SDH codes?
- What is the distribution of the SDH codes in the four document groups (eg, are codings widely dispersed or clustered in specific parts of the different document types)?

On the second, semiqualitative level of analysis we will focus on the themes and topics covered within the respective codes in each document type (eg, which topics are discussed in the passages of the respective documents assigned to the code 'living conditions').

METHODS

Overview

In our study, we analyse four key document groups, covering what medical schools are expected to teach, what medical students use to study for the national medical licensing examination and what they are expected to know when graduating. We analyse the documents using a qualitative and quantitative content analysis,[23] with a mixed deductive and inductive approach of content structuring and theme analysis, using the software MAXQDA 12 (VERBI, Berlin, Germany).

Materials

The basis for our assessment of the specific role of SDH in medical education in Germany are four key document groups that outline curriculum and assessment content in German medical education. An outline is provided in online supplementary table 1 in the annex:

1. Germany's national medical catalogue of learning objectives, called National Competency-Based Catalogue of Learning Objectives for Medicine (Nationaler Kompetenzbasierter Lernzielkatalog Medizin; NKLM).
2. An online learning software used by the large majority of German medical students in preparation for the national medical licensing examination, provided by MIAMED (AMBOSS 100-Tage Examenslernplan) (=AMBOSS).

3. The content outline for the national medical licensing examination, called Content Catalogue for the Second Part of the Examination of Doctors, provided by the German Institute for Medical and Pharmaceutical Examination Questions (IMPP Gegenstandskatalog für den zweiten Abschnitt der ärztlichen Prüfung; IMPP-GK2).
4. The full set of questions from two national medical licensing examinations, held in 2016, provided by the German Institute for Medical and Pharmaceutical Examination Questions (Zweiter Abschnitt der ärztlichen Prüfung; EXAM).

Medical studies in Germany normally last 6 years, which typically comprise 2 years of preclinical studies, followed by 3 years of clinical studies and a 1-year internship. Both after the preclinical phase and the clinical phase, all medical students take a written national examination, while an oral examination has to be passed after the 1-year internship to gain the full medical licence.[15] (Some medical faculties follow a model medical educational programme ('Modellstudiengang') in which the preclinical studies and the clinical studies are more intertwined.) Since the preclinical phase is mostly focused on basic sciences, we limit our analysis to the national medical licensing examination, which has to be passed at the end of the clinical studies.

To improve comparability and harmonise medical curricula, the German Association for Medical Education and the German Medical Faculty Association developed the German Competency-Based Catalogue of Learning Objectives for Medicine (NKLM) based on extensive stakeholder involvement. In it, all core contents of medical curricula are defined in 17 chapters, ranging from communication skills to therapeutic methods. Its aim is to state the profile and competencies for every student graduating from medical studies. It was adopted in 2015 and is currently in a pilot phase. According to a decision by the German Medical Faculty Association, every German medical faculty has been advised to implement the NKLM by aligning it with its own curricula and learning objectives. The NKLM can thus be considered a 'soft law' in German medical education. It is publicly available online and the use for research purposes is allowed under the terms of fair use.[24]

The IMPP-GK2 is the content framework for the national medical licensing examination. As it is the final written examination, the end of the theoretical phase of medical studies and the last time a student will face questions on all medical disciplines, it is an important milestone. The IMPP-GK2 lists 'health problems' and specific diseases that are used to draft questions for the national medical licensing examination. Medical schools are responsible to prepare their students for this examination and the quality of the education at a medical faculty is often judged by the results of its students in the examination. We, thus, consider the IMPP-GK2 to influence curriculum design and student learning behaviour in preparation for the examination. The document is publicly available online, use for research purposes was considered to be allowed under the terms of fair use.[25]

Based on the content of the IMPP-GK2, the German Institute for Medical and Pharmaceutical Examination Questions (IMPP) develops 320 multiple choice questions for the second part of the state examination, which takes place biannually. The two (at the beginning of our study) most recent examinations, from spring and fall 2016, were selected for our analysis. We acquired the permission to use these examinations for research purposes by courtesy of the IMPP (obtained by FH, 17 January 2017). As noted before, this examination is one of the key milestones in German medical education and determines part of the final grade students receive on graduation. We, thus, consider it to have a strong influence on student learning behaviour. In accordance with previous research, we assume that both the IMPP-GK2 and the examination itself are suitable materials to assess the role of SDH in medical education on a national level.[22] In particular, the national medical licensing examination is the only standardised assessment taken by all medical students in Germany, therefore, it is the only examination that could ensure every medical student is evaluated on basic SDH-related content.

AMBOSS is a learning software, which provides a 100-day learning plan, specifically developed to prepare medical students for the national medical licensing examination. AMBOSS is the most popular online learning system, most recently used by 95% of medical students in the preparation for the national medical licensing examination (number according to MIAMED (on personal correspondence, 9 January 2018)). User access for medical students is provided through a 'campus licence' by the majority of German medical faculties (31/38). The widespread use of the AMBOSS learning software was the main reason to select it as a key document, as it ensures that almost every student is exposed to its content. Unlike medical textbooks, AMBOSS's content is specifically tailored to the contents of the national medical licensing examination (which might differ in depth and focus from general medical textbooks). Besides the 100-day learning plan, AMBOSS provides an online reference database for medical students and practising doctors. Of note, our analysis is restricted to the content of the 100-day learning plan and does not cover the remaining content included in AMBOSS, which has a broader scope and also includes continuing medical education material intended for practising physicians. We acquired the permission to analyse the AMBOSS content from MIAMED (obtained by FH, 26 May 2017).

This study does not investigate the individual interests of medical students in SDH or educational opportunities offered by individual medical schools, but the representation of SDH attributed on a national level. We chose the before-mentioned four key document groups based on the assumption that they adequately represent said national-level learning objectives. We also assume that

they have great influence on the design of curricula and student learning behaviour.[26–28]

Development of coding system

In order to identify and define descriptors of the SDH codes, such as 'reducing social and health inequities through action on SDH' or 'raising awareness on SDH and health equity among health professionals', we conducted a manual search of WHO main website and the web sites of the respective WHO regional organisations on key documents on SDH.[2 3 29–36] We conducted a focused literature review to inform the overall research design as well as the background and discussion section of our study. For the literature search, we used a PubMed search syntax based on SDH and Medical Education as core search concepts (the full syntax is provided in the annex). The search yielded 95 results, which were screened by one study author (FH or PvP) at title and abstract level using the systematic review screening software Rayyan (Qatar Computer Research Institute, Qatar). Fifty-three relevant full texts were identified, which were screened and reviewed by one study author (FH, PvP, KG, SD or JMS). During the course of the study, further relevant publications were identified and included.

To further identify and define descriptors of SDH, two authors (JMS, FH) manually searched WHO website for key documents on SDH.[2 3 29–36] The documents were manually screened by the same authors on whether they provided substantive information on SDH.

To develop a coding system for our analysis, we first built a skeletal coding system in a deductive process. As a starting point, we used the final report of the CSDH 'Closing the gap in a generation: Health equity through action on the SDH' (hereafter named the CSDH report), with 11 thematic chapters forming a preliminary coding system. This recent report is a highly influential and widely recognised document covering SDH and containing explicit reference to medical education and training. One additional code (labelled 'SHD in general') was created to capture text pertaining to SDH in general, while not being specific to any of the 11 individual SDH. In a next step, two authors (JMS, FH) assessed the CSDH report and other key WHO documents and subsumed emerging concepts and themes as descriptors under the 12 main codes. In part, we renamed the codes to capture the broad literature-based concepts subsumed under them. For example, the code based on chapter 13 'Gender equity' was broadened to 'Non-discrimination' on the basis of other key WHO documents to also include discrimination and inequities based on individual or population characteristics other than gender. In order to reduce overlap between the codes, an iterative process of (1) exploration of concepts and codes was conducted, (2) assessment of potential overlaps, (3) rearrangement and subsumption of concepts. For example, we moved aspects of affordability and financial risk protection from the code universal health coverage to healthcare financing to reduce overlap among these codes. The process was reviewed and discussed within the whole research team to establish consensus.

Definitions of these 12 codes were derived from the CSDH report or other key WHO documents focused on SDH by either extracting a given definition or summarising and subsuming the central themes and aspects. This process was conducted primarily by three authors (JMS, PvP, FH) and was discussed within the research team.

Besides these 12 thematic codes, the two auxiliary codes were created based on the iterative process: One code, labelled 'Explicit', for passages which mention SDH explicitly; and a second code, labelled 'Socioeconomic status and health' for passages in which (1) the interaction of socioeconomic status in terms of income, occupation and education status is discussed (eg, impact of poverty on disease risks) or (2) inequalities and/or inequities within a given population are discussed (eg, difference in life expectancy between two federal states of Germany). The second auxiliary code was primarily added in order to conduct a content analysis on the role of socioeconomic status and health as core elements of the concepts of SDH across all 12 SDH codes. This second auxiliary code is primarily meant to facilitate the quantitative content analysis of the documents on the basis of key cross-cutting aspects in the discussion on SDH, for example, the role of poverty and inequality and/or inequity.

The core and auxiliary codes are displayed in table 1. Online supplementary table 2 in the annex provides the definitions and descriptors as developed in the process described above.

Development of a coding guideline

In order to reduce intercoder subjectivity, we developed a coding guideline with specific coding rules for each code. For this purpose, we first defined a preliminary coding guideline, containing the label and definition of each code, as well as inclusion and exclusion criteria.

We used this preliminary coding guideline to code a sample of all four data sources (the contents of 2 days of the 100-day learning software of AMBOSS, one chapter of the NKLM, the whole of IMPP-GK2 and one-third of one of the two licence examinations). The coding was conducted by one to five analysts and discussed afterwards by at least three analysts. Prototypical text passages for the respective codes were added to the coding guideline as anchor examples. For text passages where the assignment to a code remained unclear, this conflict was solved in discussion by at least three authors, and the coding guidelines were revised accordingly. After approximately 1/8 of the material of all four data sources had been coded, the process of coding worked smoothly with a high level of intercoder agreement and as no new unclear cases emerged, we assumed that data saturation was reached and the coding guideline to be ready for application. This full coding guideline is provided in the annex in online supplementary tables 3–8.

Table 1 List of SDH codes and the documents they were derived from

SDH codes	CSDH report	Other key WHO documents
1. SDH in general	Part 1: Setting the scene for a global approach to health equity	2 3 29 30 36 42 43
2. Early childhood development and education	Equity from the start (chapter 5)	2 3 29 30 32 36
3. Living conditions	Healthy Places Healthy People (chapter 6)	2 3 29–33
4. Employment and work	Fair Employment and Decent Work (chapter 7)	2 3 29 30 32
5. Social protection	Social Protection Across the Lifecourse (chapter 8)	2 3 33 36
6. Universal health coverage	Universal Health Care (chapter 9)	2 30 36 43
7. Health in all policies	Health Equity in All Policies, Systems, and Programmes (chapter 10)	2 29 30 36 44 45
8. Health financing	Fair Financing (chapter 11)	2 29 30 33 36 43
9. Role of markets	Market Responsibility (chapter 12)	
10. Non-discrimination	Gender Equity (chapter 13)	2 29 30 36 46
11. Political empowerment	Political Empowerment—Inclusion and Voice (chapter 14)	2 29 30 36
12. Global governance	Good Global Governance (chapter 15)	2 29 30 33 36
Auxiliary codes		
Explicit		
Socioeconomic status and health	Part 1: Setting the scene for a global approach to health equity	2 34

CSDH, Commission on Social Determinants of Health; SDH, social determinants of health.

Moreover, in order to maximise consistency and reproducibility, we developed general coding rules applicable to all codes, covering formal issues. These general coding rules underwent the same testing and revision process as the content-related, code-specific coding guidelines. See the annex for general coding guidelines (online supplementary table 3), document-specific coding guidelines (online supplementary tables 4–7) and additional code-specific coding guidelines (online supplementary table 8).

Coding

For the final coding of our data, two analysts will independently code the material from the beginning. After finishing the coding of one primary data source, all analysts involved in applying the code will discuss unclear cases and differences in the application of the code. If no solution can be found between the two analysts, conflicts will be discussed between the analysts or the group as a whole. Moreover, we will evaluate the quality of the coding by calculating the degree of intercoder agreement.[23]

Data analysis plan

We will conduct a quantitative and qualitative analysis. First, we will assess the absolute frequency of the 12 codes across all four data sources combined as well as for the four document groups separately. Next, we will calculate the relative frequency of the different codes within the four document groups by dividing the number of words assigned to the code with the number of words across

Table 2 Document-specific characteristics on which the calculation of the relative frequency of codes within the documents will be based on

National medical catalogue of learning objectives (NKLM)	Online textbook (AMBOSS)	National medical licensing examination outline (IMPP-GK2)	National medical licensing examination (EXAM)
Competencies (Kompetenzen) Subcompetencies (Teilkompetenzen) Learning objectives (Lernziele) Practical examples (Anwendungsbeispiele, Beratungsanlass; Krankheit)	Chapters (Lernkarten) Days of the 100-day learning schedule	Foreword Systematical and alphabetical order of health disorders Clinical picture, incl. specific examples	Questions Case examples (Fallbeispiele)

IMPP-GK2, Institute for Medical and Pharmaceutical Examination Questions-Gegenstandskatalog für den zweiten Abschnitt der ärztlichen Prüfung; NKLM, Nationaler Kompetenzbasierter Lernzielkatalog Medizin.

the body of text in the whole documents. Additionally, we will calculate the relative frequency of the codes by building on the specific characteristic of the documents, for example, in the medical examinations, we will calculate the number of questions with an assigned code by the number of questions without an assigned code.[37] The document-specific characteristics, which will be taken into account when calculating the relative frequency of codes within the documents, are displayed in table 2.

In a next step, two to three authors will conduct a cross-assessment of passages assigned to the respective codes to conduct a theme analysis assessing the content and context of the passages. This will be conducted by first paraphrasing and then generalising the content of each coded section, followed by a reduction and combination of passages with similar content.[23] Conflicts will be solved through discussion within the research team.

Quality considerations

In order to reduce subjectivity, all authors (research-specific background of researchers provided in online supplementary table 9 in the annex) jointly reflected, shared, discussed and documented their preconceptions regarding the research subject and expected research findings at the beginning of the research process (Section'Research team and reflexivity' in the annex). While coding, analysing and interpreting the data we will try not to be influenced unduly by these preconceptions and expectations, and carefully consider the possibility of bias arising through them. These are laid out in brief in the annex.

Based on our coding guideline (online supplementary table 3 in the annex) two analysts will conduct the coding independently on all source materials. Conflicts will be solved through discussion between the analysts or the group as a whole. The independent coding followed by discussion is done to fully explore the richness of the data, to control for subjective blurring and to achieve intersubjective certifiability by including and discussing multiple perspectives in the research process.[23 38 39] Moreover, the reproducibility will be measured and reported via the intercoder agreement, as explained above.

Patient and public involvement

Beyond the authors, no external experts from the public or patient representatives were involved in the development of the study protocol.

ETHICS AND DISSEMINATION

With our research, we hope to contribute to an improved understanding of the current status of SDH in medical education in Germany, which may help to inform the current ongoing reform process in Germany's medical education system as well as the general debate about public and global health in Germany.[40] The study has the potential to set a reference point for future studies investigating the role of SDH in medical education in Germany. Furthermore, studies on other related thematic contexts in medical education as well as studies on the role of SDH in medical education in other nations could be conducted based on the developed methodology.

This study is based on the analysis of existing data, which does not contain personal or otherwise sensitive information. We, therefore, do not expect any harm for individuals arising from the conduct of our study.

The study was initiated in October 2016 and is currently ongoing. We are planning to start with data analysis once our protocol is published and aim to finish the project by the end of 2018. Results from the study will be published, independent of the nature of the results, in scientific peer-reviewed journals and at conferences. Authorship will be granted only to those who fulfil the authorship criteria recommended by the International Committee of Medical Journal Editors. We will report the results using the Standards for Reporting Qualitative Research checklist.[41]

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Contributors FH and PvP: conceived the study. PvP, FH and KG: conducted a general literature search on topic. JMS and FH: conducted the literature search of SDH-related WHO documents and preliminary development of coding guidelines. FH, PvP, JMS, KG and SD: participated in overall study design as well as writing, editing and piloting the protocol. FH: obtained the primary data.

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Competing interests None declared.

Patient consent Not required.

Ethics approval The research will be undertaken in accordance with the declaration of Helsinki in their respective current versions. As it is a document analysis, no review by an ethics committee was deemed necessary.

Provenance and peer review Not commissioned; externally peer reviewed.

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COREQ (COnsolidated criteria for REporting Qualitative research) Checklist

A checklist of items that should be included in reports of qualitative research. You must report the page number in your manuscript where you consider each of the items listed in this checklist. If you have not included this information, either revise your manuscript accordingly before submitting or note N/A.

Topic	Item No.	Guide Questions/Description	Reported on Page No.
Domain 1: Research team and reflexivity			
Personal characteristics			
Interviewer/facilitator	1	Which author/s conducted the interview or focus group?	Not applicable
Credentials	2	What were the researcher's credentials? E.g. PhD, MD	protocol
Occupation	3	What was their occupation at the time of the study?	protocol
Gender	4	Was the researcher male or female?	protocol
Experience and training	5	What experience or training did the researcher have?	protocol
Relationship with participants			
Relationship established	6	Was a relationship established prior to study commencement?	not applicabl.
Participant knowledge of the interviewer	7	What did the participants know about the researcher? e.g. personal goals, reasons for doing the research	not applicabl.
Interviewer characteristics	8	What characteristics were reported about the inter viewer/facilitator? e.g. Bias, assumptions, reasons and interests in the research topic	not applicabl.
Domain 2: Study design			
Theoretical framework			
Methodological orientation and Theory	9	What methodological orientation was stated to underpin the study? e.g. grounded theory, discourse analysis, ethnography, phenomenology, content analysis	7
Participant selection			
Sampling	10	How were participants selected? e.g. purposive, convenience, consecutive, snowball	5-6
Method of approach	11	How were participants approached? e.g. face-to-face, telephone, mail, email	not applicabl.
Sample size	12	How many participants were in the study?	not applicabl.
Non-participation	13	How many people refused to participate or dropped out? Reasons?	not applicabl.
Setting			
Setting of data collection	14	Where was the data collected? e.g. home, clinic, workplace	not applicabl.
Presence of non-participants	15	Was anyone else present besides the participants and researchers?	not applicabl.
Description of sample	16	What are the important characteristics of the sample? e.g. demographic data, date	not applicabl.
Data collection			
Interview guide	17	Were questions, prompts, guides provided by the authors? Was it pilot tested?	not applicabl.
Repeat interviews	18	Were repeat inter views carried out? If yes, how many?	not applicabl.
Audio/visual recording	19	Did the research use audio or visual recording to collect the data?	not applicabl.
Field notes	20	Were field notes made during and/or after the inter view or focus group?	not applicabl.
Duration	21	What was the duration of the inter views or focus group?	not applicabl.
Data saturation	22	Was data saturation discussed?	8
Transcripts returned	23	Were transcripts returned to participants for comment and/or	not applicabl.

Topic	Item No.	Guide Questions/Description	Reported on Page No.
		correction?	
Domain 3: analysis and findings			
Data analysis			
Number of data coders	24	How many data coders coded the data?	7/8
Description of the coding tree	25	Did authors provide a description of the coding tree?	Suppl.
Derivation of themes	26	Were themes identified in advance or derived from the data?	7 / protocol
Software	27	What software, if applicable, was used to manage the data?	7
Participant checking	28	Did participants provide feedback on the findings?	not applicable
Reporting			
Quotations presented	29	Were participant quotations presented to illustrate the themes/findings? Was each quotation identified? e.g. participant number	supplement 1
Data and findings consistent	30	Was there consistency between the data presented and the findings?	8-11 / supp. 1
Clarity of major themes	31	Were major themes clearly presented in the findings?	8-11
Clarity of minor themes	32	Is there a description of diverse cases or discussion of minor themes?	8-11

Developed from: Tong A, Sainsbury P, Craig J. Consolidated criteria for reporting qualitative research (COREQ): a 32-item checklist for interviews and focus groups. *International Journal for Quality in Health Care*. 2007. Volume 19, Number 6: pp. 349 – 357

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How are social determinants of health represented in German medical education? – A qualitative content analysis of key-curricular documents

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How are social determinants of health represented in German medical education? – A qualitative content analysis of key-curricular documents

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Abstract

Objective: The WHO Commission on Social Determinants of Health has called for a health workforce trained in recognising, understanding and acting on the social determinants of health (SDH). However, little is known about how current medical education prepares graduates for this challenge. This study analyses the extent to which the German medical education incorporates content on SDH.

Design: Following a published protocol, in 2018 we conducted a qualitative and quantitative content analysis of three key document groups, defining and guiding what medical schools are expected to teach and what medical students are expected to know when graduating in Germany. We developed the coding system in a mixed inductive and deductive approach based on key WHO documents.

Setting: Medical schools and the medical education system in Germany

Results: Important gaps exist in the representation of SDH in medical education in Germany. Between 3% and 27% of the analyzed document-elements made reference to SDH and only 0% to 3% of those document-elements made explicit references to SDH. While some aspects were covered widely (e.g. topics of occupational health, early childhood development and hygiene), other topics such as health inequalities or determinants outside of the health care system were not or hardly represented.

Conclusions: A stronger and more explicit representation of SDH in German medical education is needed to prepare the new health workforce for current and future challenges in our globalized world and for medical schools to be socially accountable.

Strengths and limitations of this study

- The content analysis is based on a pre-developed and peer-reviewed study protocol and followed the good scientific practice for qualitative research.
- This is the first study to systematically assess social determinants of health in medical education in the comprehensive way of analyzing current key-documents for medical education in Germany.
- This analysis does not cover the curricula of individual medical schools, locally developed learning materials or electives (e.g. developed and run locally by committed students and teachers).
- This study does not address how a medical curriculum covering all important aspects of SDH could be developed in practice and if the applied 12 codes are sufficient to cover the broad spectrum of SDH in teaching.

Introduction

The WHO has defined social determinants of health (SDH) as the conditions in which people are born, grow, live, and age and the wider set of forces and systems shaping the conditions of daily life[1].

There is robust evidence that SDH have a strong and far-reaching impact on health at the individual and population level[2-5], and that the observed inequalities in health outcomes between individuals and populations are for the most part attributable to inequalities in SDH[1,6,7]. Social inequity in particular has been widely recognized as a key driving factor for differences in health status – on the international, national, regional and local level[1,8,9]. Awareness of the importance of the socioeconomic status and health and the causes for the differences in risk-factors and health outcomes is important for an adequate treatment of vulnerable populations and an adequate understanding of their needs. Knowledge of and skills in the field of SDH can support physicians in their everyday practice, for example by improving the understanding of patients' adherence to particular treatment regimens[10-12]. Acknowledging the importance of SDH, the WHO Commission on Social Determinants of Health (CSDH) emphasizes the necessity and advantage of a SDH-framed mind-set for health professionals. It recommends that SDH should be a standard and compulsory part of the training of medical students and other health professionals[1].

This is in line with calls for the increased social accountability of medical schools. Social accountability is based on the idea that medical schools should address the "the priority health needs of the community, region, and/or nation they have a mandate to serve"[13,14]. In order to do this, the graduates need to be "prepared as change agents for a more equitable and performing health system"[15]. The Lancet Commission on medical education for the 21st century calls for competency-led curricula which prepare healthcare professionals for the

challenges in the future arguing that "fragmented, outdated and static curricula are producing ill-equipped graduates"[16]. Also on national level there are recent calls to strengthen education of health professionals on SDH as part of public- and global-health-challenges, which reflects the importance of SDH for health professionals acting in contexts of local, regional and global health inequalities[17-19]. However, little is known so far about the current role SDH play in the German medical education system. A study from the late 1990's which investigated the role of social medicine in 32 curricula of German medical schools documented a substantial neglect of this subject[20]. Compared with this previous study, relevant challenges regarding the representation of SDH in German medical curricula and exams still exist. However, ongoing reforms in the structure of medical studies as well as rising national and international recognition of the relevance of SDH constitute an important window of opportunity. To our best knowledge, no in-depth study of the representation of SDH in current medical education in Germany has been conducted. Against this background, our study aims to answer the following questions: (1) To what extent do the national education frameworks for medical students include references to SDH? (2) Which thematic focus is currently set in the incorporation of SDH? (3) Which strengths and weaknesses exist in the thematic coverage?

Methods

We conducted a qualitative and quantitative content analysis of the representation of SDH in three key document groups for German medical education. The document groups we included cover what medical schools are expected to teach and what medical students are expected to know when graduating in Germany. Our analysis was based on a mixed deductive and inductive approach of content structuring and theme analysis. First, we

developed a system of codes derived deductively from the CSDH-report[1] as well as other key publications of WHO focusing on SDH (for the list of codes see figure 1). Second, these codes were applied to the document groups using the software MAXQDA 12 (VERBI, Berlin, Germany). Third, the results were analyzed both quantitatively (absolute and relative frequency of the codes) and qualitatively (clustering of frequent topics covered in two of the three documents). The methods of our analysis are outlined in detail in our study protocol[21].

Patient and public involvement

Patients and the public were not involved in the design or conduct of the study.

Data sources

We analyzed the following documents:

(1) Germany's 'National Competency-Based Catalogue of Learning Objectives for Medicine' (*Nationaler Kompetenzbasierter Lernzielkatalog Medizin)* (=NKLM). The NKLM was developed by the German Association for Medical Education and the German Medical Faculty Association, adopted in 2015 and is currently under revision. The NKLM states the profile and competencies for every student graduating from medical studies. The content of the NKLM is structured into three levels: *competencies* (level 1), *sub-competencies* (level 2) and *learning objectives (level 3)*. *Practical examples* substantiate these three levels.

(2) The Content Catalogue for the Second Part of the Examination of Doctors, provided by the German Institute for Medical and Pharmaceutical Examination Questions (IMPP) (*IMPP Gegenstandskatalog für den zweiten Abschnitt der ärztlichen Prüfung)* (=GK2). The IMPP-GK2 is the content framework for the national medical licensing examination, a nationwide examination covering the content of the clinical phase of

medical studies, which the students are required to pass in order to move on to the final year of practical education. The GK2 document consists of three parts: (i) *introduction* (ii) *health disorders* and (iii) *diseases and syndromes*. Part ii consists of a list of health disorders in alphabetical and systematic order *(*e.g. “depression”, ”diarrhea”). Part iii lists health disorders oriented towards the ICD-10 system (e.g. “A20-A28 Certain bacterial zoonosis”, “A 20 Plague”, “A 21 Tularemia”, etc.).

(3) The full set of questions from two national medical licensing examinations (*Zweiter Abschnitt der ärztlichen Prüfung)* (=EXAM), held in 2016 (the most recent examinations available at the beginning of the study), provided by the IMPP. Each EXAM consists of 320 multiple-choice questions and 12 case studies. The multiple-choice questions often provide a short contextualization and are mostly 20-200 words in length with five options provided as answer options. The case studies are descriptions of a specific clinical case with a length between 500 and 1500 words to which around 15 questions are assigned to. For the EXAM, we calculated separately the number of questions to which at least one code was applied relative to the number of all questions (“questions” in figure 2) and the number of case studies to which at least one code as applied (to their entire length) relative to the overall number of case studies (“case studies” in figure 2).

Our study protocol provides a detailed description of these documents and their role in the German medical education system[21]. A summary of the study results focused on the NKLM contributed to the current debate on the NKLM revision process in Germany[22].

Data analysis

The development of the coding framework is described in the study protocol by Hommes et al[21]. In order to maximize intersubjectivity, consistency and reproducibility, we developed coding guidance in the form of definitions, an overview of key components, inclusion and exclusion criteria for individual codes, as well as general coding guidelines applicable to all codes. These documents are provided in our study protocol[21].

The coding framework consists of 12 codes (figure 1) plus two auxiliary codes: (1) *Socioeconomic status & health*, to be applied to passages with reference to the interaction between socioeconomic status and health (e.g. by discussing the interaction between poverty and health outcomes) and (2) *explicit*, to be applied to passages making an explicit reference to SDH-relevant aspects, (e.g. by discussing the impact of a family environment affecting a child's access to medical services) instead of merely mentioning SDH (e.g. by mentioning different social environments).

The coding frame was applied to the documents independently by two analysts using the software MAXQDA 12 (VERBI, Berlin, Germany). Unclear cases and differences in the application of the codes were solved through discussion between the analysts. After finalizing the coding, these were reviewed and discussed within the research group.

For the quantitative content analysis, we assessed the absolute and relative frequency of the codes across all three data sources. The assessment of the relative frequency is based on the relevant structural elements of the respective document (e.g. in the case of EXAM: the number of questions receiving an SDH-code).

The qualitative analysis of the EXAM and GK2 assessed which SDH-related topics are covered for each code and how SDH are represented in the text. Two to three authors conducted a thematic analysis of the content and context of the coded passages through

paraphrasing followed by generalizing and reducing the content of each coded section and combining passages with similar content into topics. After assessing all coded passages, we discussed data saturation and assumed it to be reached.

All members of the research team studied medicine in Germany and had been exposed to parts of the data sources throughout their study. In order to reduce subjectivity and in order not to be influenced unduly by preconceptions, all authors jointly reflected, shared, discussed and documented their preconceptions regarding the research subject and expected research findings at the beginning of the research process and continued this practice throughout the coding process (see Hommes et al 2018 for more details).

As this study is based on the analysis of existing, publicly available data (except for IMPP exams), which does not contain personal or otherwise sensitive information, we do not expect any harm for individuals or patients arising from the conduct of our study.

Results

General

In total, we coded n=893 passages across the three document types with at least one of the 12 codes. Examples for such passages containing a reference to SDH are provided in table 1 and 2 in the appendix. By far, most passages were coded in the NKLM (n=716), followed by the EXAM (n=117) and the GK2 (n=60), which also reflects the length of the documents. Most often, we applied the code *Universal health coverage* (n=272), followed by *SDH in general* (n=190) and *Early childhood development* (n=164). Across all documents, we did not identify any passage applicable for the codes *Political empowerment* or *Role of markets*. The code *Global governance* was only applied in the NKLM (n=2), as was the code *Health in all policies* (n=7).

The absolute number of codes applied over all three document groups as well as within each document group is displayed in figure 2. The distribution of codes applied varied considerably across the three documents, which is displayed in figure 1 and figure 2.

Figure 2 displays the distribution of codes relative to the length of the document.

EXAM

Out of all (n= 640) questions, we applied at least one code to 14% of all questions (n=88) and out of all (n=24) case studies 38% (n=9) had at least one passage with a reference to SDH. We considered 4% (n=4) of all coded questions and none of the coded case studies to have an explicit reference to SDH. We coded 3% (n=3) of the coded questions, <1% of all questions and none of the case studies in the exams with *Socioeconomic status & health*.

GK2

Of all analyzed passages (n=572) 3% (n=20) were coded with at least one code. Out of all coded passages 5% (n=1) were considered to have an explicit reference to SDH. None of the coded passages in the GK2 met the criteria for the auxiliary code *Socioeconomic status & health*.

NKLM

Out of all (n=112) competencies, 28% (n=31) were coded with at least one code and 19% (n=54) out of all sub-competencies (n=279). Of all coded passages across the three levels we considered 21% (n=84) as explicit and we identified 5% (n=21) passages meeting the criteria for *Socioeconomic status & health.* While these are relatively few mentions contrasted with the length of the NKLM, some of them were very explicit. Such as: “12.20.2.2 [The medical

student] is able to explain the relationship between social inequality and health and disease"[23].

Qualitative analysis – the most common SDH topics

In table 1 and 2 (see appendix), containing all codes as well as exemplary passages, we provide an overview over the most common topics within the four most frequent codes of the EXAM and GK2, which were: *Employment & work, Universal health coverage, Early childhood development* and *SDH in general*. For instance, in the EXAM, passages referring to the SDH code *Employment & work* mostly addressed exposure to health related risk factors at the workplace (57 %), followed by the impact of disease on the ability to work (20%), occupational accidents and diseases (17%), and the impact of the workplace on mental health (6%). Passages in the EXAM coded with *Universal health coverage* most often referred to public health preventive measures and surveillance (22%), the availability and accessibility to preventive-, rehabilitation- and nursing services (19%) and medical guidelines in the context of quality assurance (19%). The passages coded with *Early childhood development* mostly contained references to the physical and psychological development of children and adolescents (42%), the social, educational and language development of children and adolescents (17%) or referred to prevention of development disorders through vaccination (17%).

Discussion

Summary

In this quantitative and qualitative content analysis, we assessed the extent to which SDH are currently represented in key documents outlining, defining and guiding medical

education in Germany. We found that SDH are represented to a limited extent with considerable differences across document type and SDH aspect. The range of SDH-representation ranged from 27% out of all competencies in the NKLM to merely 4% in the GK2. Our analysis found a pronounced heterogeneity among the SDH-aspects: While some aspects of SDH, such as early childhood development and occupational health are well represented, the analysis reveals substantial gaps of SDH-aspects as well as within the codes applied. References e.g. to a health-in-all-policies approach or non-discrimination (including gender sensitivity) in regard to access to health, are currently hardly or non-represented. Only a fraction of references were explicit or addressed the relation between socioeconomic status and health.

While the strong representation of the codes *Early childhood development*, *Employment & work* and *Universal Health Coverage* is to be welcomed, one has to be aware that these high scores reflect methodological approaches and decisions, in particular our inclusive definition of SDH-domains:

As chapter 3 in the report of the WHO Commission on SDH focuses on the importance of (early) childhood development for social, economic and health outcomes in later life, we reflected this in our coding guideline as well: Most references to *Early childhood development* focused on physiological and pathological development patterns of children or the long term preventive effect of vaccinations. While "a good start in life"[1] is an important determinant for individual development, one could question the classification of developmental disorders as a SDH if the focus is purely on biomedical reasons for development deficits without referring to important social and economic determinants of childhood development; for example are health consequences of childhood poverty,

disorders resulting from preventable harmful behaviours or events during pregnancy or the influence of a child's physical, social or family environment not or hardly addressed.

With occupational medicine being part of the medical curriculum, *Employment & work* was the SDH-code most often used in the EXAM. The focuses of the coded passages were symptoms and diagnosis of occupation related diseases and accidents as well as workplace related hazards. However, issues of employment, such as the interaction between health behaviour and (long-term) unemployment, the social and health consequences of informal and precarious employment, or forced labour were not addressed in the GK2 or EXAM. Similarly, the strong representation of *Universal health coverage* in the NKLM is mostly based on a broad representation of evidence-based medicine issues, references to institutions of the health care system, medical confidentiality and hygiene as part of the medical practice. While these issues are highly important, relevant omissions regarding *Universal health coverage* in the GK2 and the EXAM include highlighting or addressing issues of accessibility, acceptability, non-discrimination of health care services as well as sufficient medical and scientific quality of health services.

Important omissions

Three codes could not at all or only rarely be applied in all three documents: *Role of markets, Political empowerment* and *Global governance*. One reason could be the complexity of the concepts, which makes their operationalization challenging. Furthermore, one could argue, that these issues are not relevant for physicians as knowledge and skills and these domains do not support the health professional in the treatment of and interaction with individual patients, and are therefore rightfully omitted. By contrast, the NKLM defines seven key professional roles a physician should fulfil in the health care system; of which one is the professional role of health advocate[23]. In order to improve the

health of individuals as well as patient groups and populations, medical students should be trained to inter alia interact and collaborate with other health professionals, institutions and organizations of the health care system in the interests of patients and the general public. In order to fulfil this professional role, a differentiated knowledge about the broad social, political and economic determinants affecting the health of patients is important[1-5,24], even if those go beyond the sphere of individual medical practice in patient health care. This includes knowledge of global health institutions and governance, the influence of trade and markets in shaping behaviours and environments as well as of political deprivation and participation as political determinants of societal wellbeing as those are the forces and systems carving out the conditions of daily life in which people are born, grow, work, live, and age. Physicians in the role of health advocates can thereby contribute to the health-in-all-policies approach as well as to universal health coverage and the 2030-Agenda for Sustainable Development[25-27].

Explicit SDH references

Moreover, an additional important omission revealed in our analysis is the limited number of explicit references to SDH and a lack of attention to the importance of socioeconomic status and health as well as health inequalities – both at the centre of the concept of SDH: Only 13% of all coded passages contained an explicit reference to SDH. While the NKLM has the highest rate of explicit references (20% of coded; 3% of total), the rate of general and explicit references drops when it comes to the actual state examination questions. This is important, as the NKLM is a not a legally binding document, but aimed to guide medical faculties in the development of their curriculum. The EXAM and the GK2 form the basis on which the performance of medical students is judged on and they therefore mainly prepare for.

Social accountability of medical schools

Addressing SDH is one of the building blocks of a socially accountable medical education. In discussing how medical schools meet their social obligation, three steps can be distinguished: social responsibility, social responsiveness and social accountability[15]. Using SDH as an example, responsibility refers to an implicit consideration, e.g. through courses on SDH and their impact; responsiveness would incorporate community-based activities and ensure an adequate distribution of graduates to address inequities; lastly, accountability represents the most advanced step, with societal needs at the core of decision-making and agenda-setting of medical schools.

Our study can only help assess the first of these steps and answer whether German medical education as a whole is socially responsible. The results outlined above show that social responsibility with respect to SDH is still poor. We do acknowledge that some medical schools offer (optional) modules that could be characterised as socially responsive. Despite notable exceptions, it is questionable how medical schools on the whole can advance to social responsiveness if the national frameworks guiding their curricula do not reflect their social responsibility.

Transferability of the findings

Whether our findings on the representation of SDH are transferable to other medical education systems is likely to depend on numerous factors within and beyond the health care system. For example, due to the legacy of the particular German history in the 20th century, the discipline of public health has lost influence in the German health care system in favour of individual medicine. It could be assumed, that countries with a stronger and an uninterrupted history of public health development are likely to have a stronger emphasis on public health topics in medical education, to which SDH are central. We assume, that in

countries with similar health care systems to Germany (e.g. Austria) the findings are more easily transferable.

Both the methodology of our study as well as the study results can help to inform similar research approaches in other countries and regions to explore this hypothesis. Thus, the framework can be used as a tool to assess and adapt existing (medical) curricula for a broader and more explicit representation of SDH at national and local level.

Strengths and limitations

Our study has several strengths. Our analysis is based on a pre-developed and peer-reviewed study protocol[21]. The methodology to assess the way and extent to which a topic is covered in the German medical education could be adapted to other related questions and document groups (e.g. to assess the individual curricula of all medical schools in Germany). The results provide valuable insights into the current role of SDH in the medical curriculum in Germany. Because of their normative role, they also pose significant levers when intending to increase the role of SDH in the future[21].

Our study also has limitations. For capacity reasons we were not able to conduct the analysis of four document groups, as outlined in our study protocol, but had to focus within the quantitative analysis on three and within the qualitative analysis on two document groups. Our analysis does not cover the curricula of individual medical schools, locally developed learning materials or electives, which are often developed and run locally by committed students and teachers[28-30]. Moreover, we did not discuss how a medical curriculum covering all important aspects of SDH could be developed in practice and if the applied 12 codes are sufficient to cover the broad spectrum of SDH.

Conclusion

Based on the findings of our study, we suggest the following approaches to strengthen SDH in medical curricula. (1) Closing the gaps. Medical curricula should not focus on single aspects of SDH but aim to encompass the broad spectrum of SDH with relevance for the future health workforce. In order to increase awareness for how SDH shape the health and wellbeing of patients, (2) SDH need to be addressed more explicitly. In particular, there needs to be (3) more emphasis on the interconnectedness of social status and social stratification with the health status of populations and individuals as well as on the issue of health inequalities within and between societies. In our study for instance, many questions in the EXAM include a general introduction. Using these passages to (4) frame and contextualize questions with regard to the social reality people are born in, grow, live, and age could be a simple approach to strengthen SDH. With SDH being at the centre of public health (5), strengthening population health aspects in the medical curriculum in Germany is warranted. Greater cultural change within medical schools is needed to achieve true social accountability (6) as conceptualised in the Global Consensus on Social Accountability (2010). Education on SDH can (7) strengthen interdisciplinary learning, curriculum development, teaching, and practice.) The results, in combination with similar studies, should serve as a basis to develop a SDH-framework for medical curricula (8), which serves as a benchmark for all medical schools.

This study fills a knowledge gap on the role of SDH in German medical education. It provides insights for an evidence-informed approach to strengthen the representation of SDH in the medical education system in Germany and beyond. This study aims to better prepare health care professionals for current and future public and global health challenges. This is in line with the WHO's position that SDH should be a standard and compulsory part of the training of medical students and other health professionals[1].

***1: Relative distribution of applied codes**. The figure shows the relative number of the twelve applied codes and their distribution across the exams, the GK-2, the NKLM. Relative refers in this case to the share of each code out of all codes applied to the specific document groups (EXAM, GK-2, NKLM) as well as to the share of all codes applied across the three documents. (SDH = Social Determinants of Health; ECD = Early childhood development; UHC = Universal Health Coverage.)*

***Figure 2: Number of elements across the documents containing an explicit or non-explicit reference to social determinants of health**. The figure shows the distribution of elements across each of the three document types containing an explicit or non-explicit reference to social determinants of health relative to the total number of elements contained in the document.*

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Ethical approval

As the study is based on an analysis of secondary data which is for the most part publicly available, the risk associated with the study and its outcomes was considered neglectable, and as the study did not involve human subjects, no IRB approval was needed.

Competing interest statements

The authors KG and SD are involved in the revision process of the NKLM. The bvmd is involved in the revision process of the NKLM as well.

Author contribution:

FH and PvP conceived the study. FH and JMS developed the coding frame and FH, KG, PvP, SD, and JMS pilot tested it on a sample of documents. The coding of the documents was conducted by FH, SD and JMS. The analysis was conducted by FH, KG, PvP, SD, and JMS. FH and JMS drafted the manuscript with support from PvP, SD and KG. FH obtained the primary data.

Data sharing statement: The NKLM and GK2 are publicly available. The IMPP questions can be received from the IMPP upon request. We provide the coding frame of the document as a supplement. Additional documents can be provided upon request.

Code / document	IMPP	GK-2	NKLM	Total
1. SDH in general	11%	7%	24%	21%
2. ECD	18%	50%	16%	18%
3. Living conditions	14%	15%	6%	8%
4. Employment & work	29%	15%	5%	9%
5. Social protection	8%	0%	4%	4%
6. UHC	17%	13%	34%	30%
7. Health in all policies	0%	0%	1%	1%
8. Financing of social services	3%	0%	2%	2%
9. Role of markets	0%	0%	0%	0%
10. Non-discrimination	0%	0%	7%	5%
11. Political empowerment	0%	0%	0%	0%
12. Global governance	0%	0%	0%	0%

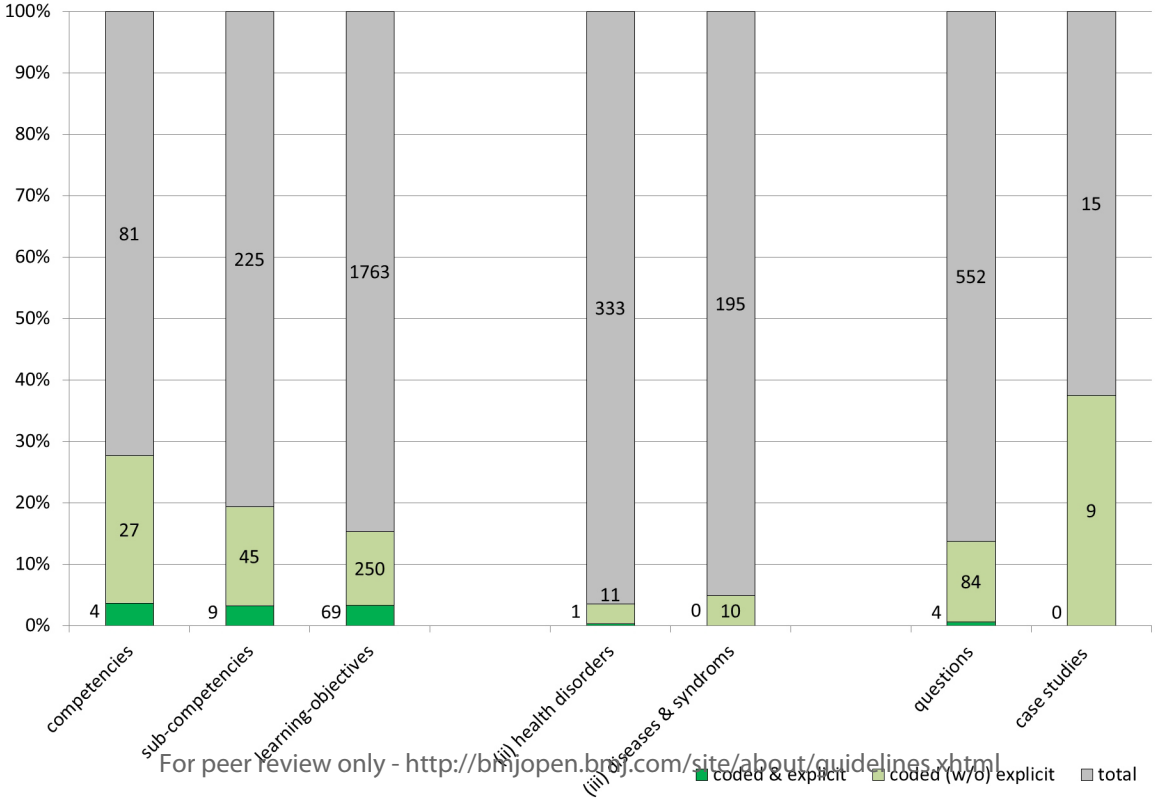

Table 1: Overview over qualitative analysis of coded passages in EXAM. The table displays the results of the detailed analysis of the segments coded in the document types EXAM. Each passage was assigned a label or short description ("distinct aspects"), which were summarized to topics represented within each code. An example is provided for each topic.

Code 4: Employment and work (29% of all codes; n=35 distinct aspects within code)			
Topics	**[%] of topic in the code**	**Distinct Aspects**	**Example**
Exposure to health related risk factors at the workplace (biological, physical, chemical, ergonomic and psychosocial hazards)	57%	Reference to exposure to health related risk factors in the workplace (vector-borne diseases)	"A 25 year old male is employed in a supplier of the automobile industry. His occupation primarily consists of the manufacturing of parts made out of foamed material and the tailoring of rigid foam plates. He also spray coats metal parts with synthetic material. Now, the patients suffers from an irritation of the throat, a sensation of retrosternal pressure and tightness of the chest, as well as a shortness of breath similar to asthma with dry, wheezing and whistling breathing noises. In each case, these symptoms occur about one hour after the start of work. Which occupational cause is most likely?"
		Reference to exposure to health related risk factors in the workplace (restricted mobility)	
		Reference to exposure to factors, which might worse existing diseases (heat, cold)	
		Reference to exposure to health related risk factors at workplace (chemical substances, industrial processing)	
		Reference to exposure to health related risk factors in the workplace (chemical substances, industrial processing)	
		Reference to exposure to health related risk factors at workplace (infectious patients in hospitals)	
		Reference to exposure to health related risk factors in the workplace (infectious patients in hospitals)	
		Reference to exposure to health related risk factors in the workplace (chemical substances, industrial processing)	
		Reference to exposure to health related risk factors in the workplace (chemical substances)	
		Reference to exposure to physical health related risk factors at workplace (UV-radiation)	
		Reference to exposure to health related risk factors in the workplace (infectious patients in hospitals)	
		Reference to exposure to health related risk factors in the workplace (chemical substances, industrial processing)	
		Reference to exposure to health related risk factors in the workplace (physical factors, vibration)	
		Reference to exposure to health related risk factors in the workplace (chemical substances, industrial processing)	
		Reference to exposure to chemical and physical health related risk factors in the workplace	
		Reference to exposure to chemical and physical health related risk factors in the	

		workplace	
		Reference to exposure to health related risk factors in the workplace (particle, fine dust)	
		Reference to exposure to health related risk factors in the workplace (particle, fine dust)	
		Reference to exposition against health related risk factors in the workplace (particle, fine dust)	
		Relation to occupational factors, which increase the likelihood for risk behavior	
Occupational accidents and diseases	17%	Reference to occupational accident	A 72-year old former miner states that he has lost about 5kg of body weight in the past 3 months. He feels weak and drained and suffers from profuse sweating. He increasingly suffers from chesty coughs; yesterday he noticed blood in his sputum. You arrange a chest x-ray and detect a pea-sized opacity in the right hemi thorax with a connected wedge-shaped clouded area. You diagnose a bronchial carcinoma which is verified using bronchoscopy and cytology. As you suspect a link to the former occupation as a miner, you report the substantiated suspicion of an occupational illness.
		Reference to occupational accident	
		Reference to deadly occupational accident	
		Reference to impact of the workplace on health status; causing of occupational illness	
		Reference to impact of the workplace on health status; causing of occupational illness	
		Reference to impact of performed profession on health	
Impact of disease on the ability to work	20%	Reference to resumption of work after infectious disease, which has constituted a potential public health risk	You treat a 54-year old metal worker's gonarthrosis. He believes that he is not able to continue his occupational activity, which is performed while walking and standing and repeatedly involves lifting and carrying of weights of more than 10 KGs.
		Reference to impact of disease on further occupation	
		Reference to impact of pain on ability to work	
		Reference to impact on disease on possibilities for professional training career	
		Reference to impact of disease on ability to work	
		Reference to impact of disease on ability to work	
		Reference to impact of disease on ability to work	
Impact of workplace on mental health	6%	Reference to impact of job loss on mental health	Ms. H reports to have suffered from depression for several years. She reports that she therefore cannot work anymore and is on sick leave. She states that the cause of her depression are difficult working conditions, including mobbing.
		Reference to impact of workplace on mental health (mobbing)	

Code 6: Universal Health Coverage (17% of all codes; n=32 distinct aspects within code)			
Topics	**[%] of topic in the code**	**Distinct Aspects**	**Example**
Legal guardian system	3%	Reference to legal guardian system (Representation by another person in case of loss of personal power of judgement in case of disease)	[...] Mrs. P. therefore intends to enable Mr. K. to represent her in the future in matters of health care, if and as long as she is unable to take care of her own affairs in the field of health; he should decide under these conditions as her representative, for example, in terms of health checks, with regard to medical treatment or medical interventions.
Public health preventive measures and surveillance	22%	Reference to vaccination recommendation by STIKO	During an EHEC outbreak in a city, the incidence of diarrhea cases in a school increases and EHEC is detected. An investigation by the health authority reveals that 27 out of 30 students who regularly receive lunch at school were found to have infection or colonization with EHEC.
		Reference to vaccination recommendation by STIKO	
		Reference to surveillance measures by public health authorities	
		Reference to institutional framework of civil protection	
		Reference to infection protection law	
		Civil protection to prevent the spread of infectious diseases	
		Reference to screening of potential infections	
Company physicians as institution	9%	Reference to institution of company physicians	You are a company doctor at a large municipal company. One aspect of your occupation is to provide occupational health care services to gardening and landscaping professionals.
		Reference to screening measures of occupational health	
		Reference to legal framework of occupational safety	
Availability and accessibility of preventive-, rehabilitation- and nursing services	19%	Reference to rehabilitation measures	Your general practice is in a deprived area, a "social hotspot". Many of your patients are unemployed. In addition, you have an above-average number of citizens with a migrant background among your patients. Compared to the average population, you have higher proportion of smokers among patients visiting your practice. As a result, many of your patients suffer from chronic obstructive pulmonary disease (COPD). Only treating individual patients symptomatically is not enough for you. You therefore plan to intensify your preventive efforts to reduce COPD among your patients. Which of the following statements on prevention are most likely to be correct?
		Reference to rehabilitation measures	
		Reference to established medical screening measures	
		Reference to private complementary insurance to cover a rehabilitation program	
		Reference to availability of outpatient nursing service	
		Access to preventive programs	

Medical confidentiality	9%	Reference to medical confidentiality	[...] The ophthalmologist of Mr. K states strongly that his state of health prohibits him from driving a motor vehicle and gives comprehensive explanations of why this is the case. The ophthalmologist carefully documents her warnings and explanations in the medical records. However, the patient proves to be impervious to advice and despite all the coaxing he again and again drives his car on public roads. Thereby, he poses a permanent danger. In misjudgment of his situation, Mr. K. repeatedly states that he is still coping with driving "really well". He has had "the car driver's license" for decades and still enjoys driving. Hence, he wants to have the opportunity to to use the care whenever he wants to do so. [He states that] fortunately, his wife does not know about the state of his eyesight. After the many futile efforts to keep Mr K. from driving his motor vehicle, the ophthalmologist is considering revealing her patient's inability to drive to the responsible administrative authority for the elimination of hazards. The doctor wonders if she herself has done everything that must or should precede any communication to the authority. Which of the following measures is most appropriate for the ophthalmologist to do before the eventual disclosure of Mr. K's ineptitude?
		Reference to medical confidentiality	
		Reference to medical confidentiality	
Medical guidelines in the context of quality assurance	19%	Reference to national disease management in the context of quality assurance	You care for a 43-year-old female patient with acute-onset low back pain. You consider arranging an x-ray examination for the patient and find a national Disease Management Guideline for this condition on the internet. According to the guideline, no imaging should be performed in acute low back pain if a serious course has been ruled out clinically.
		Reference to vaccination recommendations of STIKO	
		Reference to guidelines in the context of recognizing occupational illnesses	
		Reference to vaccination recommendations of STIKO	
		Reference to WHO guideline for hand hygiene in the health sector	
		Reference to guideline in context of evidence-based-medicine and institutional structures	
Hygiene in the health sector	19%	Reference to hand hygiene of medical personnel	In 2009, the WHO issued a guideline on hand hygiene in healthcare sector, the content of which has been widely adopted in national guidelines and recommendations as well as in the "Clean Hands" campaign. Which statement on hygienic behavior is most likely correct in the situation described above?
		Reference to hygiene measures in direct contact with patients	
		Reference to measures within the health sector in case of handling infectious patients	
		Reference to hygiene measures in case of infectiousness	
		Reference to measures within the health sector in case of handling infectious patients	
		Reference to security in individual treatment of patients	

Code 2: Early Childhood Development and Education (18% of all codes; n=24 distinct aspects within code)			
Topics	**[%] of topic in the code**	**Distinct Aspects**	**Example**
Physical and psychological development of children and adolescents	42%	Reference to sexual development	[...] Felix's mother is informed of the verified diagnosis of celiac disease and Helicobacter pylori-associated gastritis [of her child]. She is furthermore informed of the necessary therapeutic measures, in particular the special celiac diet. Following the recommendations, the symptoms quickly improve. A follow-up examination shows that Felix has gained a lot of weight. The celiac antibodies are almost within the normal range, so that these laboratory parameters indicate a good compliance with the special celiac diet
		Reference to impact of disease in childhood on further development (including adulthood)	
		Reference to impact of disease in childhood on mobility behavior	
		Reference to failure to thrive	
		Reference to failure to thrive	
		Impact of perinatal infection on health and physical development	
		Reference to impact of a genetic syndrome on health, physical and sexual development	
		Reference to necessity of dietary measures in the context of the impact of a special diet on child development	
		Reference to monitoring of childhood development	
		Impact of chronical diseases on childhood development	
Social, educational and language development of children and adolescents	17%	Reference to language development of children	Paul, 8 years old, presents as an outpatient in the company of his mother. His performance in the third grade of elementary school is inadequate, in "working and social behavior" he has a grade of 4 [equivalent to D in the US grading system]. His mother describes Paul as very impatient and impulsive. In class, he stands out for his distracting comments, for running around, and for frequent chatting with other children. He quickly engages in physical conflicts with his classmates, often feels criticized quickly and reacts in a very sensitive manner. In class, he is easily distracted; his work style is impulsive and faulty. Mostly, he returns his class test first and does so far too early. Even though his teacher and his parents are convinced that the child is able to do basic arithmetic and knows the spelling rules, he makes a lot of mistakes, because he does not read the task at hand properly and "just starts out with doing something which is why his answers are often wrong. The situation has deteriorated recently, with increased frustration leading to more rapid aggressive reactions, refusal to participate in school and to massively disturbing the class. Several meetings have taken place in the school [to discuss his case]. The mother states, that if his behavior
		Reference to influence of chronic diseases on mental development, in particular school degree	

		Impact of disease on school development and social participation of children and adolescents	continues he may be expelled from school. There are no difficult familial problems at the moment (except those as a result of the above-mentioned difficulties). [...]. Extensive diagnostics conclude average intellectual performance with a heterogeneous performance profile. The parent and teacher questionnaires reveal significant issues of attention and concentration, motor restlessness, and impulsivity.
		Reference to social effects (behavioral disorders) in case of non-treatment of a chronic disease	
Negative impact of parental care on children	4%	Negative impact of maternal ideology on health of the child	A mother presents her two-year-old boy at the pediatrician's office, because she is worried about his physical development. The following is noted during the physical exam: distensions at the osteochondral borders at the wrist and the ribs, a bell-shaped deformation of the thorax, an open fontanelle, a failure to thrive, muscular hypotonia and delayed development of the teeth. The child is only feed using breast milk and the mother is vegan. Any form of supplementation with vitamins / dietary minerals is opposed by the mother for ideological reasons, both for herself and the child. What are the findings most likely to be attributable to? (A) Vitamin B12 deficiency ; (B) Vitamin D deficiency ; (C) Hypothyroidism (D) Vitamin E deficiency ; (E) Zinc deficiency
Child abuse	8%	Reference to child abuse	A mother presents her 5-year-old boy at the pediatrician's office. He has earache and a fever. The pediatrician's examination leads to the diagnosis "acute otitis media with effusion". Additionally, the pediatrician notices two double streaks on the back during the examination. These are two, doubled-streaked, reddish signs of bleeding of 8 and 10 cm in length, respectively, both double streaked blood extravagates run in parallel with a distance of about 0.5 cm to each other; the skin between the reddish streaks of the respective double streaks seems pale. One of the two double streaks is on the right, the other on the left side of the back, each on the level of the shoulder blade and almost oriented horizontally. Apart from the double-streak-shaped signs of trauma (each with blanching), there are no other signs of violent physical damage. According to the laboratory report, the child has no blood coagulation disorders.
		Reference to child abuse	
Screening and preventive measures	13%	Reference to neonatal medical screening	
		Reference to neonatal medical screening	
		Reference to medical screening of children	
Prevention of development disorders through vaccination	17%	Reference to vaccination	Melanie received the STIKO-recommended vaccinations on schedule.
		Reference to vaccination	
		Reference to vaccination status	
		Reference to vaccination status	

Code 1: SDH in general (11% of all codes; n=20 distinct aspects within code)			
Topics	**[%] of topic in the code**	**Distinct Aspects**	**Example**
Impact of illness on social participation, individual way of living and social environment	65%	Indirect: Impact of illness on independence in everyday life / individual way of living	Ms. H. reports that she has been suffering from memory impairment for 6 months and has had to write down almost everything. She claims to misplace things and to forget about intended actions. Additionally, she claims to be disoriented with regard to location. She reports being comfortable in her familiar environment, but unable to make her way back from the city to her home using public transit unaccompanied. In addition, she mentions a difficulty to find words and that her husband noticed the increased use of filler words. He adds, that the symptoms have been developing over a long time, at least in the past one and a half years. He also reports a pronounced 'perception disorder', with his wife overlooking things. For example, in larger groups of persons she fails to notice known persons and thus does not greet them. He states that she is unable to play card games, as the amount of cards overwhelms her. Overall, she is not able to cope with daily activities without his help. Ms. H. states that she has been suffering from a depression for several years, because of which she has not been working and has been certified to be unfit for work for one and a half years.
		Impact of illness on independence in everyday life / individual way of living	
		Impact of illness on independence in everyday life / individual way of living	
		Negative impact of illness on leisure activities / hobbies	
		Negative impact of illness on leisure activities / hobbies	
		Impact of illness on social participation	
		Direct: Knowledge of index for assessing basic daily functions	
		Impact of illness on social participation	
		Negative impact of illness on social functions	
		Negative impact of illness on family environment	
		Impact of illness on desire to have children	
		Impact of illness on public health (road safety)	
		Negative impact of illness on mental health of relatives	
Impact of the social environment on health Einfluss des sozialen Umfelds auf die Gesundheit	5%	Social networks and relationships as predictor of illness	Near the end of the inpatient treatment of Mr K., he asks about the long term prognosis of his schizophrenic psychosis. During the conversation, the attending physician pointed to the general difficulty of a reliable early prognosis in an individual case. Taking statistical aspects into consideration, meaning prognostic trends, several predictors of the course and outcome of schizophrenia can be named, though. From this general perspective, predictors for a favorable or good prognosis can be differentiated from those that point to an unfavorable or poor prognosis. The trend is predictively favorable for a short 'duration of untreated psychosis' (DUP). Which of the following factors is on the contrary primarily counted as an unfavorable predictor of schizophrenia? (A) acute onset of disease; (B) Premorbid personality: Outgoing, extroverted (C) gradual onset of disease with negative symptoms; (D) Married status of the diseased person; (E) female sex of the diseased person

Wellbeing and quality of life in the context of mental health	10%	Impact of illness on mental health and wellbeing	A 18-year-old patient presents with the following behavioral disorders: He reports throwing his head to the left at irregular intervals while uttering grunting sounds, or grabbing clothing at the collar with his right hand and pulling it up in a fierce movement. These involuntary movements which he can hardly suppress started at the age of 16. First, they were discrete and he tried to hide them by pretending that they were deliberate. Over time, this became increasingly difficult. The grunting started about one year later. Because his conduct was met with incomprehension, he withdrew from social interactions which harmed his vocational training and his mood substantially.
		Impact of illness on mental health and wellbeing	
Health in the context of socioeconomic status	5%	Impact of socioeconomic status on the burden of disease of a population	Your general practice is in a deprived area, a "social hotspot". Many of your patients are unemployed. In addition, you have an above-average number of citizens with a migrant background among your patients. Compared to the average population, you have higher proportion of smokers among patients visiting your practice. As a result, many of your patients suffer from chronic obstructive pulmonary disease (COPD).
Impact of ideology on utilisation of medical measures	15%	Impact of ideology on utilization of medical measures	Any form of supplementation with vitamins / dietary minerals is opposed by the mother for ideological reasons, both for herself and the child.
		Impact of ideology on utilization of medical measures	
		Negative impact of maternal ideology on health of the child	

Code 3: Living conditions (14% of all codes; n=16 distinct aspects within code)			
Topics	**[%] of topic in the code**	**Distinct Aspects**	**Example**
Violence in the immediate environment (home environment, school)	13%	Reference to domestic violence	The 22-year-old Ms. Yvonne W. arrives in a forensic outpatient clinic accompanied by her mother. She reports that she was strangled by her former boyfriend about three hours ago. Following this "violence against the neck", Ms. W. has difficulty swallowing and her voice sounds hoarse. She states that the choking had made her black out and lose consciousness for a short time.
		Reference to violence at school, within peer groups	
Exposure to health risk factors in the immediate environment (zoonosis, disease transmission by vector, hygiene, food hygiene, ultraviolet radiation)	88%	Reference to exposure to health risk factors in the immediate environment (disease transmission by vector)	[...] Mr. T states that he cannot remember with certainty to have had contact with ticks, but reports having spent a lot of time outdoors in the US over the course of his occupation and to have had stings followed by a reddening of the skin repeatedly. [...] In endemic areas, various measures for the prevention of tick-borne Borrelia infections are available [...] H2016
		Reference to exposure to health risk factors in the immediate environment (hygiene, food hygiene)	
		Reference to exposure to health risk factors in the immediate environment (disease transmission by vector)	
		Reference to exposure to health risk factors in the immediate environment (hygiene, food hygiene)	
		Reference to exposure to health risk factors in the immediate environment (hygiene)	
		Reference to exposure to health risk factors in the immediate environment (zoonosis)	
		Reference to exposure to health risk factors in the immediate environment (zoonosis)	
		Reference to exposure to health risk factors in the immediate environment (zoonosis)	
		Reference to exposure to health risk factors in the immediate environment (disease transmission by vector)	
		Reference to exposure to health risk factors in the immediate environment (disease transmission by vector)	
		Reference to exposure to health risk factors in the immediate environment (disease transmission by vector)	
		Reference to exposure to health risk factors in the immediate environment (disease transmission by vector)	
		Reference to exposure to health risk factors in the immediate environment (disease transmission by vector)	
		Reference to physical environmental factors (Ultraviolet radiation triggering illness)	

Code 5: Social protection (8% of all codes; n=13 distinct aspects within code)			
Topics	**[%] of topic in the code**	**Distinct Aspects**	**Example**
Occupational diseases in the context of social security	54%	- Reference to the existence of the concept of occupational diseases	
		- Reference to conditions for recognition as an occupational disease	
		- Reference to conditions for recognition as an occupational disease	"As you suspect a link between the illness and the former occupation as a miner, you report the substantiated suspicion of an occupational illness. The employers' liability insurance association informs you that the investigation resulted in a total of 230 WLM (working level months)."
		- Reference to conditions for recognition as an occupational disease	
		- Reference to conditions for recognition as an occupational disease	
		- Reference to financial compensation after recognition as an occupational disease	
		- Reference to financial compensation after recognition as an occupational disease	
Social protection in the context of inability to work	46%	- Reference to the possibility and prerequisites for recognition of health restrictions by an official disabled person's pass and the responsible institution	
		- Reference to the possibility of recognition of health restrictions by an official disabled person's card and the responsible institution	
		- Reference to legal framework conditions for recognition of incapacity for work or reduced earning capacity	For some years now, the 55-year-old secretary Ulrike K. is in the care of your practice because of her bilateral osteoarthritis. The osteoarthritis increasingly causes her difficulty walking. Ms K. is considering to have herself issued an official certificate of severe disability ('disabled person's pass'). She now turns to you to learn what conditions must be met and to learn where she can apply for this card.
		- Reference to criteria for recognition of the degree of reduction in earning capacity in the case of occupational disease	
		- Reference to accident insurance institution	
		- Reference to accident insurance institution	

Code 7: Health in all policies (<1% of all codes; n=2 distinct aspects within code)			
Topics	**[%] of topic in the code**	**Distinct Aspects**	**Example**
Health system and inner security	100%	- Reference to cooperation with safety authorities	
		- Reference to law for reduction of violence	
Code 8: Health financing (3% of all codes; n=8 distinct aspects within code)			
Topics	**[%] of topic in the code**	**Distinct Aspects**	**Example**
Financial accessibility of the health system	38%	- Relation to reimbursement of medical costs	The patient is desparate and entrusts himself to the physician by truthfully describing the robbery during the necessary medical treatment of his wounds; Mr B. asserts that he will never again commit such wrongdoing; he claims to have thrown his illegal gun into a canal; he does not want to surrender to the policy, though, as he has to support his family through 'honest' occasional jobs. Which of the following situational judgments is lawfully correct in the context of medical confidentiality?
		Reference to financing of rehabilitation measures	
		- Relation to individual health services which are beyond services covered of the health insurance system (“IGeL-Leistungen”)	A 62-year-old male gets his prostate-specific antigen in the serum checked as an 'individual health service' at his general practitioner's office because his father fell ill with a metastasised prostate carcinoma and he fears a genetic predisposition.
Financing of the health system	63%	- Reference to the solidarity principle in the contribution structure of statutory health insurance	
		- Relation to risk structure compensation	
		- Reference to medical billing system	You feel encouraged to inform M. E. about the solidarity principe in the social health insurance, of which he is a voluntary member. Which statement about the solidarity principle of the social health insurance is least accurate?
		- Reference to medical billing system	
		- Reference to the Medical Service of the Health Insurance Funds (“Medizinischer Dienst der Krankenkassen”)	

Code 9: Role of markets (0% of all codes; n=0 distinct aspects within code)
/
Code 10: Non-discrimination (0% of all codes; n=0 distinct aspects within code)
/
Code 11: Political Empowerment (0% of all codes; n=0 distinct aspects within code)
/
Code 12: Global Governance (0% of all codes; n=0 distinct aspects within code)
/

Table 2: Overview over qualitative analysis of coded passages in the GK-2. The table displays the results of the detailed analysis of the segments coded in the document types EXAM and GK-2. Each passage was assigned a label or short description ("distinct aspects"), which were summarized to topics represented within each code.

Code 2: Early Childhood Development and Education (50% of all codes; n=25 distinct aspects)		
Topics	[%] of topic in the code	Distinct aspects
Medical screening measures	8%	Reference to screening measures of children
		Reference to prenatal care
Child abuse	4%	Keyword child abuse
Physical and mental; social, school and language development of children and adolescents	88%	Mentioning of childhood development disorders
		N=13 reference to development disorders
		Reference to development disorders, reference to education
		Reference to development disorders in a social context
		N=3 Reference to intrauterine development disorders
		Reference to intrauterine and early childhood development disorders
		N=2 Reference to education
Code 3: Living conditions (15% of all codes, n=5 distinct aspects)		
Health related risk factors in the physical environment	40%	Reference to lung diseases caused by influences of the physical environment
		Reference to lung diseases caused by influences of the physical environment; probable reference to occupational diseases
Violence	20%	Reference to violence
Hygiene	40%	Reference to hygiene (in general, in hospitals, in public)
		Reference to food hygiene
Code 4: Employment and work (15% of all codes, n=4 distinct aspects)		
Exposition against health related risk factors at workplace	25%	Exposition against health related risk factors at workplace
Occupational diseases	75%	Reference to occupational diseases
		Reference to occupational diseases of the lung and airway
		Reference to heavy metal induced kidney diseases

Code 1: SDH in general (7% of all codes, n=7 distinct aspects)		
Topics	[%] of topic in the code	Distinct aspects
Legal and ethical aspects of abortion	29%	N=2 Reference to legal and ethical aspects of abortion
Social and psychosocial problems	43%	Keyword psychosocial problems
		N=2 Keyword problems in the social environment
Concept of Public Health	29%	Reference to non-health related impacts of diseases on on indvidual and population level
		Reference to social medicine, Public Health
Code 6: Universal health coverage (13% of all codes, n=5 distinct aspects)		
Occupational medical examinations	20%	Analysis of workplace and occupation rleated burdens and stresses.
Screening measures	20%	Reference to screening measures
Keywork disaster medicine	20%	Keyword diaster medicine
Hygiene in the health sector	40%	Reference to hygiene in hospitals
		Reference to hygiene (general, in hospitals, in public)

Standards for Reporting Qualitative Research (SRQR)*

http://www.equator-network.org/reporting-guidelines/srqr/

	Page/line no(s).
Title and abstract	
Title - Concise description of the nature and topic of the study Identifying the study as qualitative or indicating the approach (e.g., ethnography, grounded theory) or data collection methods (e.g., interview, focus group) is recommended	1
Abstract - Summary of key elements of the study using the abstract format of the intended publication; typically includes background, purpose, methods, results, and conclusions	2
Introduction	
Problem formulation - Description and significance of the problem/phenomenon studied; review of relevant theory and empirical work; problem statement	4-5
Purpose or research question - Purpose of the study and specific objectives or questions	5
Methods	
Qualitative approach and research paradigm - Qualitative approach (e.g., ethnography, grounded theory, case study, phenomenology, narrative research) and guiding theory if appropriate; identifying the research paradigm (e.g., postpositivist, constructivist/ interpretivist) is also recommended; rationale**	5-6
Researcher characteristics and reflexivity - Researchers' characteristics that may influence the research, including personal attributes, qualifications/experience, relationship with participants, assumptions, and/or presuppositions; potential or actual interaction between researchers' characteristics and the research questions, approach, methods, results, and/or transferability	9
Context - Setting/site and salient contextual factors; rationale**	4-5, 5-6; 15-16
Sampling strategy - How and why research participants, documents, or events were selected; criteria for deciding when no further sampling was necessary (e.g., sampling saturation); rationale**	5-7
Ethical issues pertaining to human subjects - Documentation of approval by an appropriate ethics review board and participant consent, or explanation for lack thereof; other confidentiality and data security issues	6,9
Data collection methods - Types of data collected; details of data collection procedures including (as appropriate) start and stop dates of data collection and analysis, iterative process, triangulation of sources/methods, and modification of procedures in response to evolving study findings; rationale**	8-9

Data collection instruments and technologies - Description of instruments (e.g., interview guides, questionnaires) and devices (e.g., audio recorders) used for data collection; if/how the instrument(s) changed over the course of the study	8-9
Units of study - Number and relevant characteristics of participants, documents, or events included in the study; level of participation (could be reported in results)	6-7
Data processing - Methods for processing data prior to and during analysis, including transcription, data entry, data management and security, verification of data integrity, data coding, and anonymization/de-identification of excerpts	8-9
Data analysis - Process by which inferences, themes, etc., were identified and developed, including the researchers involved in data analysis; usually references a specific paradigm or approach; rationale**	9
Techniques to enhance trustworthiness - Techniques to enhance trustworthiness and credibility of data analysis (e.g., member checking, audit trail, triangulation); rationale**	8-9

Results/findings

Synthesis and interpretation - Main findings (e.g., interpretations, inferences, and themes); might include development of a theory or model, or integration with prior research or theory	9-11
Links to empirical data - Evidence (e.g., quotes, field notes, text excerpts, photographs) to substantiate analytic findings	11, Table 1(Annex)

Discussion

Integration with prior work, implications, transferability, and contribution(s) to the field - Short summary of main findings; explanation of how findings and conclusions connect to, support, elaborate on, or challenge conclusions of earlier scholarship; discussion of scope of application/generalizability; identification of unique contribution(s) to scholarship in a discipline or field	11-15
Limitations - Trustworthiness and limitations of findings	16-17

Other

Conflicts of interest - Potential sources of influence or perceived influence on study conduct and conclusions; how these were managed	21
Funding - Sources of funding and other support; role of funders in data collection, interpretation, and reporting	21

*The authors created the SRQR by searching the literature to identify guidelines, reporting standards, and critical appraisal criteria for qualitative research; reviewing the reference lists of retrieved sources; and contacting experts to gain feedback. The SRQR aims to improve the transparency of all aspects of qualitative research by providing clear standards for reporting qualitative research.

**The rationale should briefly discuss the justification for choosing that theory, approach, method, or technique rather than other options available, the assumptions and limitations implicit in those choices, and how those choices influence study conclusions and transferability. As appropriate, the rationale for several items might be discussed together.

Reference:

O'Brien BC, Harris IB, Beckman TJ, Reed DA, Cook DA. **Standards for reporting qualitative research: a synthesis of recommendations.** *Academic Medicine*, Vol. 89, No. 9 / Sept 2014
DOI: 10.1097/ACM.0000000000000388