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Dental health services research: What does it want, what can it do?

Abstract:
Health services research develops, describes, clarifies, and evaluates health service processes, outcomes and relevant factors that impact on service provision. A consumer/patient focus, contextual relevance and population-relevant parameters in addition to individual-level assessments as well as multidisciplinarity and multiprofessionalism are characteristic features of health services research. The relevance of health services research in Germany is increasing. Dental health services research should aim to (1) develop innovative, cross-disciplinary care concepts and to implement them, (2) consider the common risk factor approach and dentistry's role in medical services, (3) focus on consumer/patient preferences, and (4) target social and regional health inequalities. To allow methodologically robust and thematically broad evaluations, dental health services research in Germany needs to professionalize and to link with relevant actors in the healthcare system.

Keywords: evidence-based medicine; research levels; healthcare policy; methods; public health; effectiveness

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What is health services research?

Health services research is defined as "a cross-disciplinary field of research that describes and causally clarifies medical care and healthcare and its framework conditions, contributes to the development of scientifically based healthcare concepts, conducts associated research into the implementation of new healthcare concepts, and evaluates the effectiveness of healthcare structures and processes under routine conditions" [3]. Characteristic features of health services research include a strong patient orientation, focus on the contextual application and implementation of interventions, assessment not only of individual but also group or population-relevant parameters, and a multidisciplinary and multiprofessional approach [6].

Health services research is considered more of an emerging scholarly field in Germany compared to basic research and clinical research. However, over the 20 years of its existence not only has awareness of the field grown continuously but it has also become increasingly relevant. This resulted from the awareness that scientific results from basic and clinical evaluative research cannot be transferred one to one to everyday provision of healthcare, sometimes never even reaching routine practice or only with severe limitations. A level that followed clinical evaluative research was thus required that tested knowledge from previous levels under routine conditions, identified the causes of any barriers to implementation, and finally evaluated and refined interventions applied in routine healthcare.

This is based on the fact that both basic and clinically evaluative research make use of their own methods, the results of which do not necessarily lead to interventions that can be applied or which misjudge the effectiveness of interventions in routine healthcare. Clinical evaluative research thus often focuses on the efficacy of an intervention whereby the ideal (if not always entirely workable) study model is the randomized controlled trial (RCT). The results of these classic RCTs in the field of clinical research cannot, however, provide any information about the effectiveness of interventions under routine conditions, which is subject to numerous other factors (e.g., study population, patient adherence, applicability of the intervention, sustainability). Further aspects relevant for subsequent application of an intervention in healthcare provision such as the costs of an intervention (efficiency) are only conditionally tested (and if then, often only within the special setting of a classic RCT). Such a review is necessary, however, because the effectiveness of the results of these RCTs when transferred to routine healthcare is often overestimated (the effectiveness gap; a similar thing happens when the results of basic research are transferred to clinical research). This is precisely because of the specific methods and the specific setting (highly selected patient collective, optimized application protocols, standardized and often highly sensitive outcome parameter recording, short follow-up examination periods) used in clinical research. Under routine conditions patient collectives are considerably more heterogeneous, executing studies is often more challenging due to numerous external factors, standardizing the testing of outcomes is in part more difficult and thus dependent on the investigator, and the relevant study time frames are long.

While clinical evaluative research has a high degree of internal validity due to the methods used (the results are methodologically robust), the external validity of such studies is often limited, in part because under routine conditions other patient collectives, e.g., with comorbidities, existing medications, or precarious social environments, may predominate. Such an expansion of the inclusion criteria leads, however, to heterogeneous patient collectives and considerably more complex settings (e.g., clinics instead of hospitals), consequently affecting the methodological practicability and the quality of any data collected. Therefore, these studies are very resource intensive to implement.

What methods does health services research employ?

It thus falls onto health services research to research the "translation of scientific knowledge into the provision of healthcare in terms of its effect on the quality and efficiency from individual and socio-economic perspectives" [5]. To achieve these objectives, health services research draws on numerous methods that were not, however, specifically developed for health services research but are instead derived from other research levels. A characteristic feature, however, is the multimethodological approach of many health services research projects. This results from the diversity of the aspects to be investigated, if the aim is to describe, evaluate, causally clarify, and refine (see definition above).

Health services research thus employs methods from numerous disciplines:

- The foundation is often non-interventional studies that are characterized by long follow-up examination periods and a routine setting; claims and register data are increasingly employed among others.
- Methods from evidence-based medicine are also used such as critical appraisal of existing studies (systematic reviews, meta-analyses, meta-syntheses, health technology assessments) as well as study designs derived from clinical evaluative research (pragmatic, often cluster randomized trials).
- So that the effects of an intervention in routine practice can be comprehensively determined across sectoral boundaries, elements of quality of life research are used. Health services research incorporates patients and identifies endpoints that are reported by patients (patient-reported outcomes) or that place the focus on patients (patient-centered outcomes).
- Closely related methods from psychology and qualitative research are also used. Health services research attempts to understand how and why care is administered; quantitative research reaches its limits particularly with in-depth

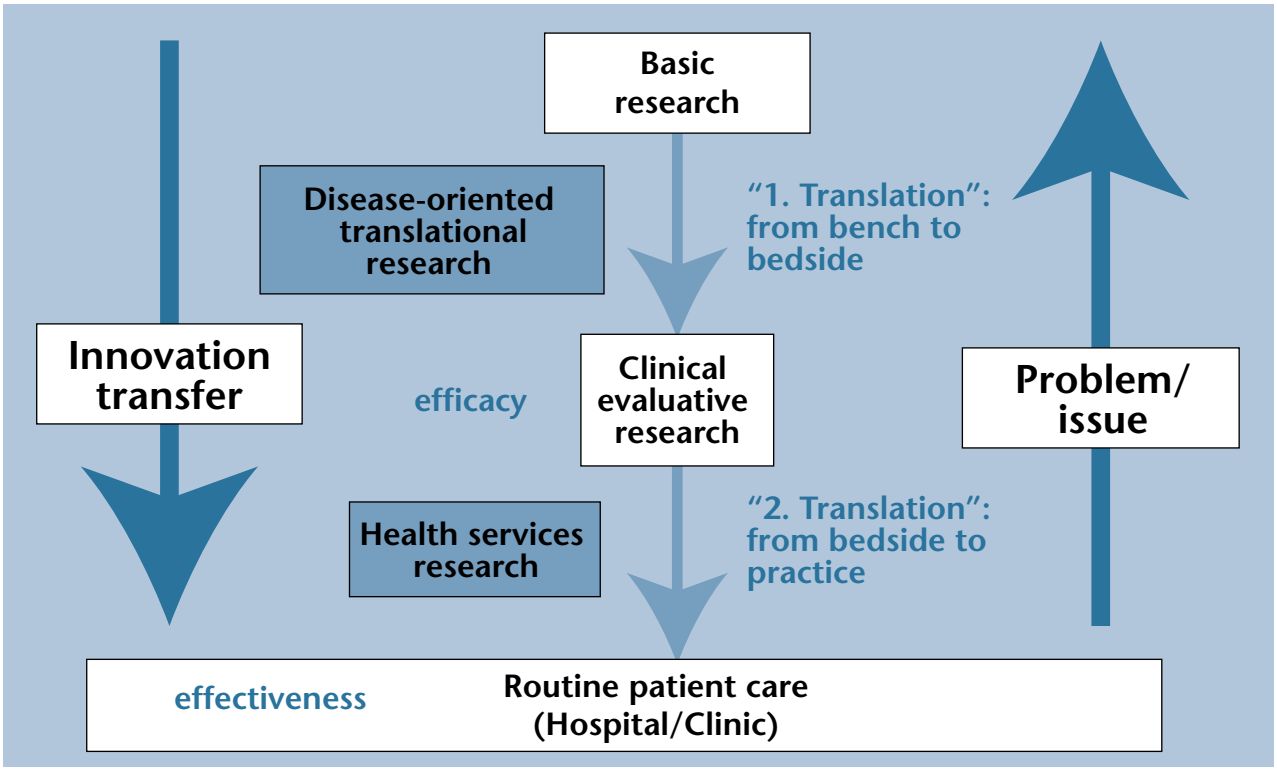

Figure 1 Various research levels must be linked for successful forwards and backwards translation.

explorations of the causes underlying healthcare measures.

- Likewise, methods from sociology and organizational sciences are used; these are often used bundled together as "implementation research" within health services research. Research aims to reveal why interventions in routine care are not applied or not applied in accordance with the recommendations; similarly, interventions are developed that increase willingness to apply measures and to improve their quality (implementation research attempts to close the second translation gap, Figure 1).
- Particularly for evaluation, health services research utilizes elements from health economics (efficiency of an intervention) and quality and safety research as well as from ethics (acceptance of an intervention, ethical implications of resource allocations).
- Finally, health services researchers must collaborate closely with clinical disciplines in dentistry and medicine (e.g., nursing research, geriatrics, etc. in the field of geriatric dentistry) in order to be able to incorporate specialist expertise.

To systematize research areas, methods, and the parties concerned in health services research, Pfaff and Schrappe developed the throughput model in 2011; the model was revised and modified in 2017 [4, 7]. This model enables relevant influencing factors to be systematically and comprehensively determined for specific issues, methods to describe and modify these factors to be defined, and appropriate endpoints to be identified or operationalized (Fig. 2).

This model still comprises the four areas described below:

1. Input factors describe factors such as patients, their needs and utilization, members of associated health professions (professionals), organizations involved in the provision of health services (e.g., insurance providers), and the healthcare system (social security model, private insurance model, NHS). Material and intangible resources are also included here. In the modified throughput model (Fig. 2) these factors are described as 1st order factors and are expanded by 2nd order factors such as contextual factors, interventions, etc.
2. The throughput factor describes the services such as healthcare services (e.g., preventive, diagnostic, and therapy forms), health technologies, and the context in which this health service is to be provided (because this can actively contribute to the implementation or inhibition of the service). This aspect of health services research is often emphasized because it is precisely here that improvements in the quality of care, access to care, etc. are promised. Particularly because the context (the specific patient, physician, their interaction, and the environment) plays such a major role here and the transformation of a "scientific intervention" into a routinely applied service does not automatically take place but is instead subject to many influencing factors (input), interventions to improve health services provision should be based in theory, that is, they should be based on an understanding of how they are intended to lead to better care in everyday life and which influencing factors they should take into account. They should be specific

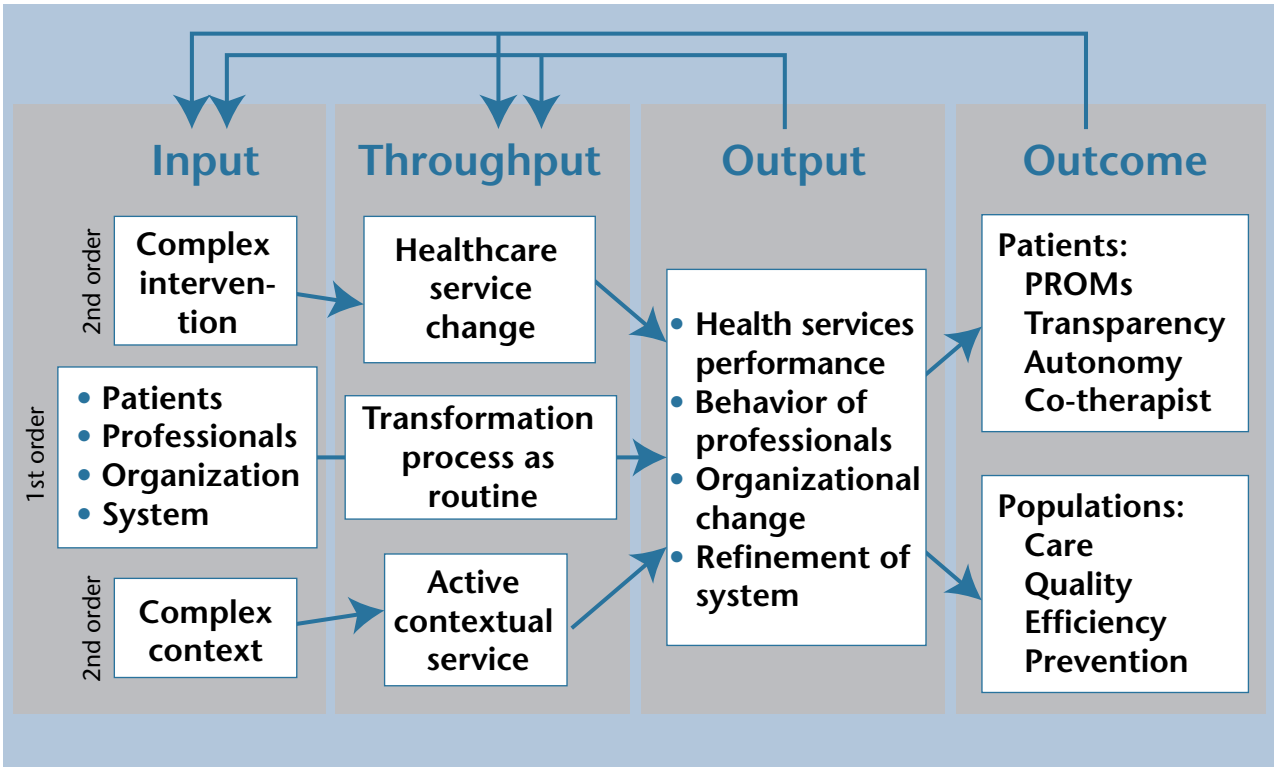

Figure 2 The throughput model derived from [4, 7]. See the text for a detailed description.
PROMs: patient-reported outcome measures, e.g. endpoint measures reported by patients

for a treatment and drive improvements in the care (treatment outcome) [2].

3. Output factors describe effects (e.g., of interventions) that in turn have consequences for the input factors. This may mean a concrete consequence for the patient resulting from a particular treatment measure but also consequences for organizational structures.
4. Finally, the outcome factors describe the results of the care. When considering these outcomes, it is critical which outcomes are actually welcomed by the recipient of the care, our patients, and how patients assess these outcomes. This consideration of the outcomes, their interpretation, and the resultant conclusions or recommended actions should also be discussed in light of issues such as robustness and appropriateness. Modification or expansion of the throughput model in regards to 2nd order factors adds the perspective of superior structures. In particular, the contextual service is considered, whereby the context can have a positive (improving the outcomes of a health service) or negative (worsening) impact.

What can health services research in dentistry in Germany achieve and how should it develop?

The opportunities for health services research in dentistry continue to be underestimated in Germany. It is necessary and essential to strengthen and expand dental care capacities and quality. A number of questions that are highly relevant for dental care, professional or health policy discussions, and improvements in dental care models and structures can only be answered using health services research.

A number of focal areas are conceivable in this regard:

- (1) Dental health services research should develop, evaluate, and monitor the implementation of innovative care concepts. In particular, research must emphasize relevant patients groups for whom routine care in Germany can only be achieved to a limited degree using established concepts, such as elderly, multimorbid, and chronically ill patients (e.g., patients with dementia, diabetes, or other systemic organic medical conditions). These patient groups are only rarely covered by clinical evaluative research and represent a growing population group with increasingly complex needs (in part as a result of the increasing preservation of teeth) [8]. Furthermore, care concepts should be developed and evaluated that link dental and medical care. The common risk factor approach is a key aspect in this regard, able to open strategic doors for dental research and integrate the dentist more closely into ongoing provision of care [9]. Similarly, dentistry can in some cases play a key supporting role in general therapy, e.g., with periodontal therapy for diabetics; however, this does require concepts that model patient flow, adequate long-term care, appropriate remuneration, and corresponding quality indicators.
- (2) Dental health services research should focus on aspects

Publically funded dental projects			
Prof. Dr. Stefan Listl	University Hospital Heidelberg	Dent@Prevent – Implementation of routine data & PROMS in evidence-informed intersectoral (dental) medical care	2016
Prof. Dr. Christian H. Splieth	Greifswald University Medical Department	IpKiSuN – Supportive intensive prophylaxis for children with dental rehabilitation under anesthesia	2016
OA Dr. Ghazal Aarabi	Hamburg-Eppendorf University Hospital	MuMi – Promoting oral health expertise and oral health in people from migrant backgrounds	2017
Prof. Dr. Katrin Hertrampf, MPH	Schleswig-Holstein University Hospital, Kiel Campus	MundZaRR – Oral health improvement using remotivation and reinstruction delegated by dentists accompanying care	2018

Table 1 Dental projects that are funded by the innovation funding.

of the patient and consumer orientation. Strengthening patient autonomy and decision-making power (participatory decision making) and generally considering patient preferences is paramount here. Particularly in international comparisons, this issue has been discussed and researched very little to date in Germany. An interconnection with clinical research is also possible here, with patient-centered outcomes increasingly being incorporated into study standards (e.g., in the definition of minimum endpoints or core outcomes that studies should investigate and report for a particular dental problem) [1]. In the area of geriatric, nursing, and special needs dentistry, the incorporation of relatives is a relevant issue that has little been considered to date.

– (3) Successes in improving oral health are often emphasized in media discussions while the pronounced and in some cases even worsening social and regional disparities in the provision of healthcare are sometimes neglected. Dental health services research is in demand for issues related to the development and evaluation of concepts to reduce these disparities. Particularly the link to public health research and other issues, such as social research and health systems research, is necessary in this regard.
– (4) The question of dental care is closely related to regional inequalities. Dental needs planning is an increasingly important issue in light of demographic polarization as well as the trend towards urbanization also of dentistry (keyword medical care centers). It may not be possible to ensure comprehensive, local, high quality care without active control. Dental health services research can help to understand which factors drive this structural change, if and how they can be modified, and how control elements can be applied, e.g., as part of cross-sectoral care concepts, in order to limit regional disparities in care.
– (5) Dental care in Germany takes place primarily in clinics; in accordance with this, health services research should take place where the care is provided. Establishing networks of clinics that carry out both outcome-related and process-related studies is an important objective. Likewise, dental health services research should increasingly utilize data from routine care. Despite the known weaknesses of secondary data, they can in part allow a deep and importantly a representative understanding of care. Similarly, a meaningful correlation allows perspectives on dental issues drawing on data from other care sectors. Collaborating with providers and statutory dentists' associations may be of use here.

To meet these requirements or to cover such a breadth of issues in a methodologically sound manner, dental health services research must be further developed in Germany. In this regard (1) changes to the university system are desirable. In many other countries (including the US, Great Britain, and the Netherlands) chairs with a health services research focus (e.g., community dental health, dental public health) contribute significantly to dental education while being institutionalized agents in the field of health services research. In Germany this has been the exception to date; independent departments for dental health services research do not exist at all. (2) Health services research should also become the focus of individual sites. This is the case only in a few university hospitals with basic and clinical research instead being paramount. With increasing federal funding (see below) and greater regard given to this field by research policy, this may possibly change; dental centers could accordingly be pioneers at individual sites, providing direction and examples. (3) There is a need for increased networking of agents in the field of dental health services research. Cooperative models from universities, clinics, social facilities, chambers, statutory associations, health insurance providers, and patient groups can have considerably greater breadth and greatly increase the impact of individual initiatives. In general, stronger links with medicine are essential; medical disciplines rarely proactively approach dentistry while at the same time they are neverthe-

less interested in possible collaborations, viewing them in a positive light. (4) Lastly, existing development opportunities must be identified and utilized. Both the German Research Foundation (DFG, without tenders) as well as the German Federal Ministry of Education and Research (BMBF, with tenders) and the Innovation Fund (promotion of health services research or the evaluation of new health services models by the Federal Joint Committee with issue-related and open-issue tenders) are available for funding. While the DFG requires that "projects seeking funding should address an underlying issue, the results of which should also be able to be translated to other problems", BMBF and the Innovation Fund are occasionally considerably more application oriented. In all three funding streams, dentistry competes with other disciplines. Nonetheless, funding applications from dentistry have succeeded in recent years, including those made to the Innovation Fund (Tab. 1).

Conclusions

The relevance of health services research in Germany is rising. Dental health services research should develop, evaluate, and monitor the implementation of innovative, cross-sector health services concepts. The common risk factor approach and the supportive role of dentistry for medical services may be key aspects here. Patient and consumer focus and the social and regional inequalities in care should also be given priority. To meet these requirements or to cover such a breadth of issues in a methodologically sound manner, dental health services research must be further developed in Germany by, among other means, professionalization and increased networking of agents in dental health services research and successfully raising competitive third-party funds.

Conflicts of interest:
The authors declare that there is no conflict of interest within the meaning of the guidelines of the International Committee of Medical Journal Editors.

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