

A Geriatric Core Curriculum for Undergraduate Dental Students

Anna K. Stuck (✉ anna.stuck@insel.ch)

Bern University Hospital, and University of Bern <https://orcid.org/0000-0001-8322-5501>

Martin Schimmel

Department of Reconstructive Dentistry and Gerodontology, University of Bern

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Abstract

Background

It is well-accepted that graduating dentists require geriatric competencies to ensure proper treatment of their elderly patients. Nevertheless, geriatric competencies in a curriculum for undergraduate dental students are often not adequately addressed. Thus, the purpose is to develop an efficient teaching model covering geriatric competencies in a dedicated geriatric core curriculum instructed by a geriatrician.

Methods

To design and develop a geriatric core curriculum, we selected domains based on clinical relevance for dental practice and specified learning objectives, aligning them to discrete competency levels. We used a case-based approach and developed real patient and/or clinical practice scenarios to elaborate the geriatric domains. In a pilot study, we implemented this geriatric core curriculum. Student satisfaction was evaluated using a feedback survey.

Results

Our geriatric core curriculum was successfully implemented for undergraduate dental students in this pilot study. Detailed learning objectives for each domain aligned to corresponding competency levels are described. Clinical practice scenarios for the case-based approach are matched to corresponding domains. Overall, the majority of students rated the domains of polypharmacy (93%), pain (71%), and decision-making capacity (57%) as highly relevant for their future clinical practice. Nevertheless, we encountered several challenges in this pilot study, namely low attendance and a suboptimal learning setting.

Conclusion

We conclude that this pilot geriatric core curriculum proves to be largely feasible and serves as an educational template.

Background

In light of the aging population, dentists will see increasing numbers of older patients in their clinical practice. Therefore, dentists will face elderly patients in conjunction with their medical, dental, and social context. According to the scenario for the Swiss population, the proportion of people 65 years and older is expected to increase from currently 18% to 27% of the overall population [1].

It is accepted that graduating dentists require competencies in geriatric treatment to successfully interact with elderly patients. This is in analogy with evidence, that internal diseases and syndromes encountered by dentists are increasing [2]. As an approach, undergraduate education on geriatric competencies on a more systematic basis has been recommended for undergraduate dental students [3]. However, a

majority of countries do not systematically address geriatric aspects in their curricula [4]. Moreover, there is great variability in the duration and content of training in geriatric dentistry [5]. Although the majority of dental schools in the United States offer dedicated programs, it was required in only 57.1% of schools [6, 7].

The Swiss curriculum of all dental schools at the Universities of Geneva, Basel, Zurich, and Bern agreed to incorporate a separate section on geriatric aspects, taking into account the specific needs of the elderly patients. Nitzschke et al. found that gerodontology in Switzerland was taught at all dental schools [8]. Nevertheless, approaches to integrate geriatric competencies in the Swiss curriculum for undergraduate dental students vary in Switzerland. Moreover, it is heterogeneous whether a geriatrician or a dentist is involved in the program as an instructor.

Thus, the purpose is to develop an efficient model covering geriatric competencies in a dedicated geriatric core curriculum taught by a geriatrician. This paper describes the design, development, implementation, and evaluation of a geriatric core curriculum as a pilot teaching model for undergraduate dental students.

Methods

Educational Setting and Rationale for the Geriatric Core Curriculum

In 2015, the division of Gerodontology at the School of Dental Medicine, University of Bern, was established. Meanwhile, a cooperation with the Department of Geriatric Medicine at the University of Bern has been established for specifically educating dental students.

The rationale for a geriatric core curriculum at the University of Bern was based on the clinical and faculty setting offering lecture classes covering all domains of the Swiss curriculum for undergraduate dental students in their final semester before graduation.

Undergraduate students at the School of Dental Medicine, University of Bern, undergo the curriculum as described in the Swiss educational objectives for dental medicine[9], which has been accredited by the Swiss Federal authorities. The Gerodontology curriculum is embedded as a dedicated course in the series of prosthodontics during the Master of Dent Medicines course. It comprises patient treatment in the scope of the synoptic clinical course taught in conjunction with the Department of Restorative, Preventive, and Pediatric Dentistry and the Department of Periodontology, and encompasses facultative one-on-one instruction in a geriatric hospital and the lecture series for “Gerodontology and Geriatric Aspects” in the second term of the 5th year. This lecture series was designed according to the recommendations of the European College of Gerodontology [3] and to be similar to courses at the University of Geneva. In Bern, it comprises 28 lecture units and reflects the multidisciplinary nature of Gerodontology. Of these 28 lecture units, 8 are specifically dedicated to the geriatric core curriculum Series that is taught by a geriatrician of the Department of Geriatrics at the University of Bern.

Development of the Geriatric Core Curriculum

Curriculum development of the geriatric lecture series began with a review of the current Swiss core curriculum for undergraduate dental students, updated in 2017 by all Swiss dental schools at the Universities of Basel, Bern, Zürich, and Geneva [9]. In this Swiss curriculum, we identified four general knowledge and skill competencies relevant to older adults on which we aimed to elaborate in this new curriculum. Therefore, we focused on learning outcomes numbered 73-76, addressing special needs of elderly patients. The main emphasis of these four general learning outcomes is on systemic diseases, functional impairments, and ethical and juridical issues in elderly patients. In particular, students are expected to take adequate steps for diagnosis, therapy, and prevention with respect to the general situation upon graduation.

Next, the European undergraduate curriculum in geriatric medicine for medical students was consulted to identify overall geriatric domains for undergraduate dental students [10, 11]. The main criterion for selecting domains was clinical relevance for dental practice. We identified eight domains (cognitive impairment and dementia, vision and hearing impairment, malnutrition, gait and balance disorders, pain, polypharmacy, decision-making capacity, and palliative care). Each domain was scheduled for one 45-minute lecture unit.

For constructing our curriculum, we used the “backward design process” as described by Wiggins and McTighe [12]. This process starts with a vision of the desired results, i.e. defining competencies students are expected to achieve prior to their graduation.

Accordingly, in a first step we phrased the learning objectives for each domain based on the taxonomy of Bloom [13, 14]. For each learning objective, the corresponding level of competencies of Bloom that could be achieved was attributed. Six levels of competencies were distinguished: level 1: knowledge, level 2: comprehension, level 3: application, level 4: analysis, level 5: synthesis, level 6: evaluation.

Next, we aligned learning activities within the geriatric lecture series to each learning objective according to the concept of constructive alignment [12, 15]. We decided to use a case-based approach using real patient or clinical practice scenarios to elaborate learning objectives. For each of the eight domains, we developed clinical practice scenarios for dentistry. This case-based pedagogy is in line with Aquifer Geriatrics, a case-based curriculum for medical students emphasizing learning outcomes and competency-based learning [16, 17].

All course material was peer-reviewed by two experienced geriatricians and finalized in consultation with the chair of gerodontology.

Student attitude survey

To assess general attitudes of dental students towards older adults, we included a previously validated German-language translation of the University of California Los Angeles geriatric attitude scale (UCLA-GAS) in the questionnaire [18, 19]. According to this scale, a negative attitude corresponded to an overall

UCLA-GAS score of less than 42 points. We distributed the questionnaire before starting the lecture series on geriatrics.

The final dedicated lecture series for geriatrics was implemented in the spring semester of 2019.

Evaluation

Student Competencies

Student competencies were evaluated by oral exams at the end of the semester. The testing strategy of the oral exams was aligned to the corresponding learning objectives [15]. We developed a clinical case scenario with standardized questions for each domain [12]. Overall, our bank includes 35 standardized questions. Each student is presented one case-scenario and three questions each.

Student satisfaction

At the end of the lecture series in April 2019, dental students were asked to fill in a survey to ascertain their satisfaction with the completed geriatric curriculum. The full survey can be found in the appendix. Students were asked to rate each geriatric domain regarding relevance for their future dental practice on a scale of 1 (irrelevant) to 4 (highly relevant). Moreover, students could also provide free comments and identify further domains or questions of interest for improving future geriatric lecture series.

We informed the students that completing the attitude questionnaire and satisfaction survey amounted to consent to an anonymized analysis of their answers for this project.

Analysis

In accordance with regulations of the Swiss Human Research Act, projects that work with anonymized data sets or anonymized samples do not require authorization. While researchers do work with health-related data of human beings, the data can no longer be assigned to any specific individual. These criteria apply to our study and therefore our study was exempt from formal ethical approval.

Descriptive statistics reporting proportions of categorical data, and means with standard deviations or medians with interquartile ranges for numerical data were used. Student satisfaction was reported as proportions of rating categories (irrelevant, slightly relevant, relevant, and highly relevant). Qualitative comments were organized according to themes. Student attitude was summarized as overall UCLA-GAS (median and interquartile ranges), and subscales (compassion, resource distribution, medical care, social value) thereof.

Results

The dedicated lecture series on geriatrics was implemented successfully in 2019 as previously described. Thirty-two out of 36 dental students attended the geriatric lecture series within their last semester of

dental school. Baseline characteristics are shown in Table 1. The median UCLA-GAS was 47 points from a maximum possible score of 70 points, corresponding to 67% of a maximum positive attitude. Only two students had an overall negative attitude toward elderly people, corresponding to an overall UCLA GAS Score less than 42 points. Overall, the UCLA-GAS subscale on “medical care” was rated most negatively (55% of the maximum score) and the subscale “resource distribution scale” was rated most positively (75% of the maximum score).

Table 2 summarizes the dedicated geriatric core curriculum, indicating specific learning outcomes for each domain. Also, the highest possible level of competency according to Bloom’s criteria is indicated for each learning objective. Finally, all case-based clinical scenarios are matched to each domain.

Figure 1 displays student satisfaction ratings for each component of the lecture series. A total of 14 students completed the satisfaction survey at the completion of the geriatric lecture series. Overall, the majority of students rated every domain except for palliative care as relevant or highly relevant regarding their future clinical practice. The domains polypharmacy (93%), pain (71%), and decision-making capacity (57%) were even rated as highly relevant for future clinical practice. In contrast, palliative care was rated as irrelevant or only slightly relevant by half of the students.

Discussion

In this pilot study, we demonstrated that a dedicated geriatric core curriculum using a case-based approach and detailed learning objectives could be implemented successfully.

The attitude of dental students toward the elderly in general prior to geriatric teaching highlights the need to gain competencies regarding the care of elderly people. Our attitude findings are similar to attitudes observed in medical students before geriatric training. Goeldin et al.[18] demonstrated that teaching targeting specific skills may improve the attitudes of medical students toward elderly patients. A similar effect may also be expected for dental students.

Overall, our pilot study meets the general components as suggested by the most recent European curriculum “The Graduating European Dentist”, as proposed by the Association of Dental Education in Europe (ADEE) [20]. These encompass general competencies such as “consider the specific needs of the older patient, including the need for domiciliary care” (area of competence 3.3) [20] and general competencies on population, demography, health, and disease (area of competence 4.3) [21]. Moreover, the geriatric aspects of components suggested by Kossioni et al.[3] are covered by our pilot curriculum, even though this curriculum is based on the outdated European undergraduate curriculum [22].

The eight geriatric domains we selected, based on the European curriculum for medical students, proved to be adequate. Students were satisfied with the presented domains and other domains were not suggested upon evaluation. Despite the fact that half of responding students evaluated palliative care as slightly relevant or irrelevant for their future clinical practice, we continue to support competencies on palliative care. The phenomenon that students do not estimate the relevance of palliative care could be

due to a lack of experience with palliative patients in clinical practice. Usually, dental students have not faced palliative care situations thus far during their university education. Thus, it could be difficult for dental students to accurately assess the clinical relevance of palliative care. Schulz et al. demonstrated that attitudes and willingness to accompany a dying patient increased after implementing a mandatory palliative care curriculum [23].

The learning objectives on geriatric competencies that we elaborated were specific and detailed, and proved to be helpful for both students and teachers. Specifically, it proved to be helpful in increasing transparency for oral exams. As a result, students and examiners were clear regarding what would be included in the exams and what would be requested for their graduation.

The case-based approach was well-received by the dental students. Students worked interactively on the patient cases. Thanks to the case-based scenarios, higher competencies according to Bloom were attained, in accordance with our objectives at the outset.

Overall, the strengths of our study include the originality of establishing an undergraduate teaching model instructed by a geriatrician, the evidence-based educational approach for curriculum development based on latest European and American guidelines, high rates of student satisfaction, and the overall feasibility of the present geriatric core curriculum. Therefore, the curriculum is considered a national and international educational template.

Nevertheless, we encountered several challenges in this pilot study that must be refined when developing the final core curriculum in geriatric dentistry. First, lecture attendance by the students was low. In the first class, 32 dental students of a total of 36 students were present in the class. In the fourth and final lectures, 14 dental students attended the class. Concomitantly, the limited sample size is the main limitation of our study. The most likely reason for low attendance is the non-compulsory setting of the curriculum. Low lecture attendance is a well-known phenomenon frequently encountered in other fields of adult education. There are various strategies to address low participation rates. One possibility is to introduce compulsory classes. However, this is not guaranteed to increase the learning effect [24]. In order to enhance active learning by students, interactive seminars in smaller groups proved to be an effective didactic method. Second, the setting of lectures makes elaborate case scenarios difficult. For medical students, case-based learning is practiced in small classes with a tutor discussing clinical patient situations [25]. Also, clinical skill trainings are incorporated in the curriculum in order to promote higher competencies.

Finally, the fact that Kossioni et al. [26] found there is lacking evidence of outcomes of formal interprofessional training of dentists in geriatrics highlights the need for further educational studies on outcomes. Thus, we will continue the geriatric core curriculum of this pilot study using the presented domains and learning objectives. On a national and international basis, the presented geriatric curriculum is expected to serve as an educational template. Nevertheless, we will continue to adjust the core curriculum and face the challenges that we encountered in this pilot study by designing a further study. We will place the focus on optimizing the case-based learning setting. For medical students, a national

U.S. curriculum Aquifer using standardized geriatric cases proved to be feasible. This case-based curriculum with standardized clinical scenarios has the opportunity to be applicable internationally. In particular, clinical scenarios can be worked out with varying emphases, and taking cultural differences into account. Therefore, we will introduce compulsory tutorials rather than lectures to improve the case-based learning setting. Moreover, methods of evaluating student competencies will be reviewed. Thereby, an objective structured clinical examination (OSCE) would be the examining method of choice. Eventually, we will implement a standardized evaluation before and after the geriatric curriculum in a further study to assess outcomes in terms of knowledge, skills, and attitude. Recently, a new geriatric attitude scale specifically developed for dentists has been introduced and will be considered [27].

Conclusion

We conclude that this geriatric core curriculum, with its case-based approach and detailed learning objectives, proved to be both feasible and reasonable. The presented geriatric core curriculum serves as a national and international template for teaching geriatrics to undergraduate dental students.

Abbreviations

UCLA-GAS, University of California Los Angeles geriatric attitude scale.

Declarations

Ethics approval and consent to participate: In accordance with regulations of the Swiss Human Research Act, projects that work with anonymized data sets or anonymized samples do not require authorization. While researchers do work with health-related data of human beings, the data can no longer be assigned to any specific individual. These criteria apply to our study and therefore our study was exempt from formal ethical approval.

Consent for publication: We informed the students that completing the attitude questionnaire and satisfaction survey amounted to consent to an anonymized analysis of their answers for this project.

Competing interests: The authors declare that they have no conflict of interest.

Availability of data and material: The dataset supporting the conclusions of this article is included within the article and its additional files.

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Authors' contributions: AKS and MS designed the study, analyzed and interpreted data. AKS drafted the first version of the work, MS substantially revised the work. Both authors AKS and MS approved the submitted version and agreed both to be personally accountable for the author's own contributions.

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Tables

Table 1. Baseline characteristics of dental students

Characteristic	Students evaluated (n=32) ^{a)}	Proportion of maximum positive attitude ^{a)}
Female gender	18 (56%)	
Age group (20-29 years)	30 (94%)	
Complete UCLA-GAS	31 (97%)	
- Overall scale	47 (45-51)	47/70 (67%)
- Compassion subscale	13 (12-15)	13/20 (65%)
- Resource distribution subscale	15 (14-17)	15/20 (75%)
- Medical care subscale	11 (10-13)	11/ 20 (55%)
- Social value subscale	7 (6-8)	7/10 (70%)
Students with negative attitude	2 (6%)	

Abbreviation: UCLA-GAS, University of California Los Angeles-Geriatric Attitude Scale

a) Values are medians with interquartile ranges, or numbers with percentages

Table 2. Learning objectives

Domains	Learning objectives	Level of competency	Case-based scenarios	
Dementia	1. The student demonstrates basic knowledge of dementia, including prevalence, definition, therapy, and prevention	2	A: 86-year-old man with cognitive impairment	
	2. The student identifies a patient with (potential) dementia in the dental practice	4		
	3. The student can describe potential difficulties treating a patient with dementia in dental care			
	4. The student takes and appraises appropriate interventions treating a patient with (potential) dementia in dental care		1	B: 87-year-old women with severe dementia
			6	
Visual and hearing impairment	1. The student demonstrates basic knowledge of visual impairment including prevalence, main etiologies, and their impact on functional impairment	2	C: 75-year-old man with hearing impairment	
	2. The student can identify a visually impaired patient in dental care	4	D: 75-year-old woman with visual impairment	
	3. The student takes and appraises appropriate interventions treating a visually impaired patient in dental care	6		
	4. The student demonstrates basic knowledge of hearing impairment, including prevalence, main etiologies, and their impact on functional impairment	2		
	1. The student can identify a patient with a hearing impairment in dental care	4		
	2. The student takes and appraises appropriate interventions treating a patient with hearing impairment in dental care			
		6		

Gait and balance disorder	1. The student demonstrates basic knowledge of gait and balance disorders including definition, prevalence, main etiologies, and effects	2	E: 89-year-old man with troubles climbing stairs in dental practice
	2. The student can identify patients with a gait and balance disorder in the dental practice		
	3. The student takes appropriate interventions treating a patient with a gait and balance disorder in dental care	4	
	4. The student describes important activities of daily living, thereby establishing the connection to gait disorders and malnutrition		
		6	
		5	
Malnutrition	1. The student demonstrates basic knowledge of malnutrition, including definition, prevalence, main etiologies, effects, and therapy	2	F: 84-year-old man with disturbance of wound healing after tooth extraction
	1. The student can identify patients with malnutrition in dental care		
	2. The student can identify enoral causes of malnutrition and stages the appropriate dental interventions for treatment/improvement	4	G: 82-year-old woman with malnutrition
	6		
Pain	1. The student demonstrates basic knowledge of pain in the elderly, including definition, prevalence, main etiologies, and entities	2	H: 85-year-old woman with pain
	2. The student can identify enoral causes of pain and stage appropriate interventions in dental care		
	3. The student considers non-pharmacological analgesic therapy when prescribing in dental care	6	
	4. The student prescribes an appropriate analgesic drug and applies the principles of safe prescribing, i.e. considers other medication that the patient is currently taking, underlying diseases of the patient, functional impairment, allergies, step-by-step plan according to the World Health Organization (WHO), and effects/side-effects	6	
		6	

Polypharmacy

1. The student demonstrates basic knowledge of polypharmacy in the elderly, including definition, prevalence, main etiologies, polymorbidity, overtreatment, under-treatment, and inappropriate treatment
2. The student prescribes an appropriate drug to a patient with polypharmacy and polymorbidity
3. The student checks indications, contraindications, side effects, and interactions of drugs
4. The student identifies important interactions and side effects of drugs in the case examples that were reviewed

2

I: 79-year-old woman with polypharmacy

J: 77-year-old woman with oral anticoagulant

6

K: 83-year-old man with metamizol

6

4

Figures

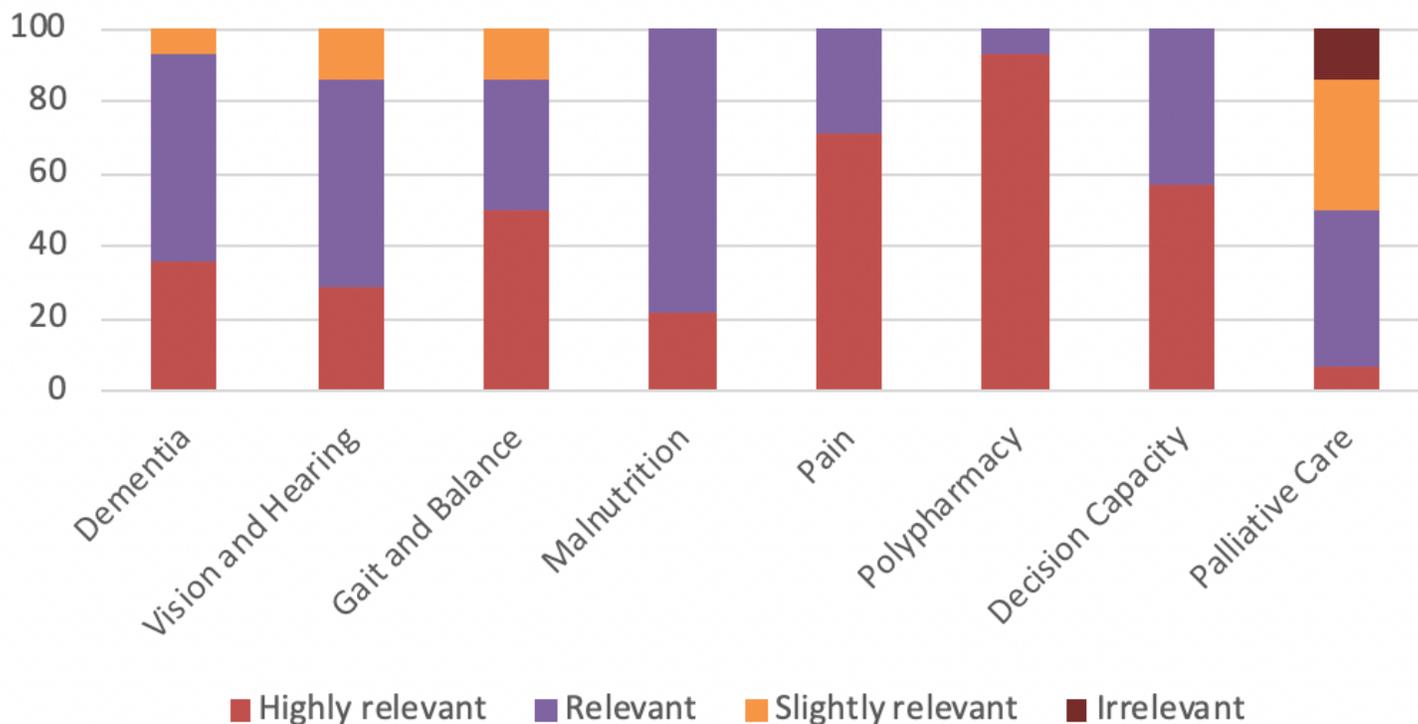


Figure 1

Results of the Student Attitude Survey

Supplementary Files

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