



Continuing medical and student education in dermatology during the coronavirus pandemic – a major challenge

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Summary

Continuing medical education (CME) is the essential basis for student teaching and for training and further development of physicians. Without it, modern and adequate patient care is unthinkable. Recently, the coronavirus pandemic, caused by the severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2), forced the entire medical community to change its usual habits of advanced medical training, teaching and learning. As a result, digital training and teaching via social media, online medical encyclopedias, web-based learning platforms and educational podcasts moved to the fore. Here, we give an overview on current concepts for online medical education, with special consideration of dermatology.

Introduction

As a non-static process, continuing medical education (CME) and continuing medical student education (CMSE) are subject to constant changes and new developments. Therefore, medical knowledge is in permanent flux.

Recently, the entire medical community was confronted with an unexpected event: the coronavirus pandemic. This rapidly spreading infection hit the world largely unprepared. Consequently, academic/clinical teachers and students were faced with the challenge of rapidly changing *i)* the manner in which they used to acquire their medical education (ME), and *ii)* their usual teaching and learning habits [1, 2].

Regarding the first aspect, general practitioners and specialists mostly ensure their general medical and dermatological knowledge and their further training by regularly reading

current original articles and reviews. They acquire further theoretical and practical skills through conferences, symposia, seminars and workshops. Medical students, by contrast, traditionally attend lectures and (practical) courses or bedside teaching at medical school and primarily use textbooks.

Since the end of January 2020, however, the coronavirus pandemic has severely hampered the traditional and familiar forms of ME in Germany and elsewhere [2].

Coronavirus pandemic

The coronavirus (COVID-19) pandemic was caused by severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) and had its origin in Wuhan, China, in December 2019 [3]. On May 25, 2020, more than 5.383 million individuals in over 187 countries were affected by the infection (COVID-19

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Dashboard of the Center for Systems Science and Engineering [CSSE] at Johns Hopkins University, USA; <https://coronavirus.jhu.edu/map.html>). SARS-CoV-2 can be detected in saliva and mainly spreads by close contact, sneezing, coughing, and droplet inhalation [4].

Consequently, the German Federal Ministry of Health released specific recommendations and measures in order to slow down the spread of the novel coronavirus. The protective measures included proper hand hygiene, correct sneezing and coughing etiquette, wearing non-medical mouth and nose masks when using public transportation or going shopping, and adhering to a minimum safety distance of 1.5 meters.

In particular, the latter measure and uniform regulations set forth by the German Federal Government to restrict social contacts made attendance teaching at universities impossible. It also prevented congresses, symposia and workshops

in their traditional form. Therefore, digital alternatives for CME and student teaching had to be implemented within a very short time.

Interestingly, some of these alternatives have been around for quite a while, though they have not yet been in the focus and at the forefront of CME and teaching. They include, but are not limited to e.g., social media, online medical encyclopedias, web-based modules/platforms for digital learning, and educational audio(visual) streams (so-called podcasts) on the world wide web (Tables 1, 2, 3).

In general, two major concepts of online CME should be differentiated. On the one hand entities that mainly provide an overview and links to current course offerings and further training opportunities offered by third party providers (Table 2). On the other hand, ventures that conceptualize, produce and organize offerings such as online courses, educational seminars, hands-on live courses, and podcasts themselves

Table 1 Overview of online medical encyclopedias; without claim to completeness.

Encyclopedia	Features	Website link
A.D.A.M. Medical Encyclopedia (MedlinePlus)	Languages: English and Spanish; $\geq 4,000$ articles on diseases, symptoms, and tests; medical photographs and illustrations; alphabetical listing; search function	https://medlineplus.gov/ency-clopedia.html
Altmeyers encyclopedia	Language: German; largest German dermatological online encyclopedia; more than 25,000 different articles from various fields of medicine such as dermatology and allergology; alphabetical listing; search function	https://www.enzyklopaedie-dermatologie.de/
e.Medpedia (Springer Verlag and Springer Medizin Verlag)	Co-production of Springer and Springer Medizin; language: German; 2,600 reference articles from 23 medical reference text books; only few article available free of charge; full text search function; subscription required (reduced fee for medical students)	https://www.springermedizin.de/emedpedia
Medcyclopaedia (Medcyclo.com; GE Healthcare)	Language: English; $\geq 18,000$; articles on diseases, symptoms, and tests; medical photographs and illustrations; media clips; no alphabetical listing; search function	http://www.medcyclopaedia.com/
The Merck Manuals online medical library	Languages: English and Spanish; $\geq 10,000$; resources/articles on medical topics with videos, images, animations, medical calculators; alphabetical listing; search function	https://www.merckmanuals.com/home
MSD Manuals online medical library	Languages: English; Spanish; German; French; Italian; Portuguese; Russian; Japanese; Korean; Chinese; Arabic; $\geq 10,000$; resources/articles on medical topics with videos, images, animations, medical calculators; alphabetical listing; search function	https://www.msdmanuals.com/home

Table 2 Overview of platforms providing links to third party-operated online education opportunities; without claim to completeness.

Platform	Features	Website link
Edukatico	Languages: German and English; ≥ 650 ; "massive open online courses" (MOOCs) on diverse medical topics from various providers; full text search function	https://www.edukatico.org/
Lecturio	Languages: German and English; $\geq 1,000$ video lectures; specific preparation courses for examinations; learning success control through interactive quiz questions; full text search function; selected lectures available free of charge; mostly, however, subscription required	www.lecturio.de ; www.lecturio.com
Univiva (naontek AG)	Language: German; courses, webinars and quality circles in the field of human medicine, dentistry, veterinary medicine, and pharmacy from various providers; categorized listing	www.univiva.de

Table 3 Overview of platforms providing self-conceptualized and self-created medical online education; without claim to completeness.

Platform	Features	Website link
AMBOSS	Languages: German and English; interactive library; interactive images, videos and charts; complete learning platform for medical students; subscription required	www.amboss.com/de ; www.amboss.com/us
DERMA-TO-LOGIN	Languages: German; English; Spanish; once-in-a-lifetime subscription grants access to the courses in all languages	www.derma-to-login.com
Meditorium	Language: German; examination-relevant medical topics provided as condensed and to-the-point audio-based podcasts; different subscription plans available	www.meditorium.de
Meditricks	Language: German; mnemonics-based audiovisual podcasts on more than 450 different pre-clinical and clinical topics; learning units are provided online as videos and interactive images and offline as books; different subscription plans available	www.meditricks.de
MEDIZIN TO GO	Language: German; live online training/courses provided free of charge by a non-profit organization	www.medizintogo.de

(Table 3). A further distinction should be made regarding the potential target audience: On the one hand medical students and on the other hand residents, general practitioners and specialized physicians.

In the following we provide an overview of existing online platforms for web-based digital ME, without any claim to completeness.

Social media

The term social media describes websites and apps that allow users to create, share and network their own contributions. In 2019, the top ten social media leaders comprised

Facebook, YouTube, Facebook Messenger, WhatsApp, Instagram, Twitter, Google+, LinkedIn, Skype and Snapchat (<https://www.digitalinformationworld.com/2019/01/most-popular-global-social-networks-apps-infographic.html>). The most important features of social media are *i*) interactivity, *ii*) collaborative writing and *iii*) social interaction between users, aka many-to-many communication. This form of user-generated content enables a permanent, unlimited exchange with others, also in the field of medicine/dermatology [5, 6].

Probably the most widespread website in this category is DocCheck (<https://www.doccheck.com>). With more than 750,000 registered members, it reflects the largest

community of healthcare professionals in Europe. DocCheck offers access to 2,500 websites containing various types and sources of online learning in six languages. Recently, a cross-sectional study among undergraduate medical students revealed that many of them intuitively searched for medical information on a specific topic on this website [7].

In a 2017 publication, Ko et al. discuss the potential benefits and pitfalls of social media in the context of ME. Although they highlight important limitations including the maintenance of medical professionalism and privacy violation issues, they conclude that social media *i)* is an innovative means to connect with a large community of medical students and physicians, *ii)* enables educational discussions and networking, and *iii)* contributes to digital CME, in particular CMSE [5].

Online medical encyclopedias

Online medical encyclopedias provide information on diseases, medical conditions, symptoms, and diagnostic tests via the world wide web. While most of these are accessible free of charge from any internet-enabled device, others require a paid subscription. They are usually written as a comprehensive compendium accompanied by medical photographs and illustrations. To avoid exceeding the scope of this overview, a selection of online medical encyclopedias, all of which are copyrighted, is listed in Table 1. We have deliberately excluded so-called wikis from this listing, as these can be generated by any user with a web browser who is granted the corresponding access rights. Thus, it is difficult to ensure that a wiki author has the appropriate scientific background to write/edit an article on a medical topic [8, 9].

Platforms providing links to third party-operated online education

Edukatico

Edukatico is a search portal for so-called “massive open online courses” (MOOCs) from various providers. Currently, more than 650 videos on medical training, nutrition and health care are listed in the category “Medicine, Pharmacy, Health” on their website.

Lecturio

Lecturio is an international online platform that offers concise and easy-to-follow medical lectures in video format. More than 250 teaching experts, including physicians/educators from prestigious American and British medical

schools, present each lesson in studio-recorded videos with illustrations.

Univiva

Univiva is a subsidiary of the “Deutsche Apotheker- und Ärztebank” (apoBank). Courses, webinars and quality circles in the fields of human medicine, dentistry, veterinary medicine, and pharmacy are provided in German. The courses are systematically categorized according to the respective providers, resulting in a comprehensive offering of advanced online training opportunities.

Platforms providing their own online medical education courses

AMBOSS

Founded in 2012 by medical professionals, AMBOSS has steadily grown from a small team to a company of 300 highly trained physicians, scientists, and software engineers today. Their main objective is to provide multiple choice questions linked to comprehensive medical information, in German and English, that is required to answer examination questions. AMBOSS thereby enables access to medical knowledge to both students and physicians [10].

DERMA-TO-LOGIN

DERMA-TO-LOGIN is a venture of medi-login and was founded by physicians/dermatologists. Intended for medical students, residents and specialists in different fields, it offers online and on-site-courses as well as podcasts covering different areas of dermatology including surgery, esthetic medicine, and mycology, in three languages. A major focus is on the acquisition of important practical and clinical skills that are often neglected in medical school and residency.

Meditorium

Primarily intended for medical students, Meditorium provides audio podcasts in German, conceived by medical professionals. In learning sessions of 5–20 minutes, clinical disease patterns are presented. Additionally, clinical images can be accessed via the app.

Meditricks

Founded by physicians, Meditricks is a learning platform primarily intended for medical students, but which is also helpful in general for memorizing medical aspects. This is

achieved with mnemonics and short stories [11], illustrated and accompanied by music.

MEDIZIN TO GO

MEDIZIN TO GO is a non-profit company founded by physicians. It provides German webinars from various medical disciplines. In live, online-courses, medical experts mediate current clinical and scientific knowledge. There is an interdisciplinary cooperation with DERMA-TO-LOGIN on intersecting themes, such as pregnancy dermatoses, sexually transmitted infections and vulvovaginitis.

Conclusions

Various forms of digital online learning were established in ME long before the coronavirus pandemic. Whereas CMSE traditionally mainly employs a lecture-based teaching model, current digital student education has steadily incorporated more interactive pedagogical techniques, including the use of social media, medical quizzes, and different online formats. Likewise, the possibilities of online courses and medical encyclopedias have enriched traditional CME for residents and specialized physicians.

There is no dispute that ME via online platforms may have disadvantages. These include *i*) a lack of social contacts with peers; *ii*) a lack of direct exchange/interaction among colleagues and/or between teacher and student; *iii*) the loss of patient interactions; *iv*) the inability to acquire hands-on practical skills. On the other hand, certain advantages are quite obvious: *i*) the option of studying whenever and wherever one wishes, *ii*) no need of textbooks, printed journal articles or a traditional library, and *iii*) being able to participate in live online courses from home without having to travel to a congress venue.

In summary, digital online learning platforms will become increasingly important in the future and will be indispensable in CME and CMSE. In this context, it is important to keep in mind that they are not meant to replace traditional forms of ME, but rather to complement them.

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Conflict of interest

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