More than Four Decades of Medical Informatics Education for Medical Students in Germany

New Recommendations Published

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Summary
The publication of German competency-based learning objectives “Medical Informatics” for undergraduate medical education gives reason to report on more publications of the German journal GMS Medical Informatics, Biometry and Epidemiology (MIBE) in Methods. The publications in focus deal with support of medical education by health and biomedical informatics, hospital information systems and their relation to medical devices, transinstitutional health information systems and the need of national eHealth strategies, epidemiological research on predicting high consumption of resources, and with the interaction of epidemiologists and medical statisticians in examining mortality risks in diabetes, in genome wide association studies and in dealing with limits and thresholds. This report is the beginning of an annual series intending to support better international cooperation to achieve good information as a basis for good medicine and good healthcare.

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“Physicians spend more than 25% of their working time with information management.” Dugas et al. state [1], and Jahn and Winter observed that in hospitals many "physicians often spend half of their working days with writing discharge letters” [2]. There is no doubt that modern technology for information processing is not only something nice to have for physicians but one of their most needed tools. Hence medical students need not only to be trained in using stethoscopes and scalpels but in using information technology as well.

Reflecting experiences after more than four decades of medical informatics education for medical students in Germany new recommendations have recently been developed by a working group of the German Association for Medical Informatics, Biometry and Epidemiology (GMDS). Starting from physicians’ daily work challenges a catalogue of competency-based
learning objectives has been provided. GMDS follows a wide mission by integrating medical informatics, biometry, epidemiology and health information management in one association. Therefore these learning objectives have been embedded in the context of biometry and epidemiology related learning objectives. The recommendations have been published as a German version in GMDS’ e-journal GMS Medical Informatics, Biometry and Epidemiology (MIBE) [1]. Since physicians’ daily work challenges in using information technology are not unique in Germany, these recommendations are based on the international “IMIA recommendations on Education in Biomedical and Health Informatics” [3] and may furthermore be of interest for the international readership of Methods of Information in Medicine (Methods). Consequently you can find an English version in this issue of Methods [4] and we hope it is stimulating for your professional environment, too.

Sharing German experiences in undergraduate medical education in the field of medical informatics with the international community is one first step of a deeper collaboration between Methods and GMDS with its e-journal MIBE as has been announced some weeks ago [5]. MIBE publishes research articles about collecting, analyzing and providing data on health and diseases and on designing processes in medical research and patient care [6]. Many of them are work results of one of the GMDS working groups. MIBE aims to support the healthy and the sick, as well as medical professionals and scientists in preventing, healing and easing diseases and to better understand their causes and impact [7]. Methods and MIBE are thus sharing the idea that good medicine and good healthcare demand good information [8] and that this requires joint research in the fields of biomedical and health informatics, medical biometry, and epidemiology. Therefore, we expect more publications of MIBE to be interesting for readers of Methods.

The editors in chief of Methods and MIBE agreed not only to encourage more authors of MIBE to submit papers to Methods but also to report annually in Methods on MIBE publications. The reports shall also help to overcome language barriers since a lot of MIBE publications are in German. Access to MIBE articles mentioned in the reports is easy because MIBE is an open access journal.

We as MIBE editors now start these reports by drawing your attention to MIBE articles of the last twelve months. Education in medicine was a hot topic and the above mentioned recommendations are only one excellent example. Additionally, papers on health information systems and on epidemiology and health economics were in the focus.

Biomedical and health informatics can contribute to high quality medical education not only by teaching health and medical informatics topics [3]. Moreover this discipline can contribute to better medical education in medical disciplines as well. Due to smartphones and fast mobile networks education and learning is no longer restricted to course rooms even in medicine. New technologies promise more interesting and more entertaining ways of learning. The GMDS working group “technology-enhanced learning and teaching” aims to enable better teaching by new technologies and published three papers as a result of their work [9].

Tolks and Fischer examined how so called ‘serious games’ can be effectively integrated in medical education and they developed criteria for their implementation [10]. Twenty nine serious games for health were tested for their applicability for undergraduate medical education. Six games proved suitable to be integrated into the medical curriculum. Behrends et al. supported the education of midwives who enrolled as students in a European Master of Science program at Hannover Medical School in Germany [11]. They provided the learning management system IILAS as a platform enabling practicing midwives to participate in lectures, seminars and tutorials at home. To support mobile learning using a smartphone Sturm and Igel realized an application on mobile devices (App) providing organizational information about lectures at German Saarland University as well as their content [12]. Apps have a great potential for supporting lifelong education for all professions in health care; but a lot of research has still to be done.

Information systems of hospitals have too long been considered as a collection of application software dealing only with management issues. But along with increasing success in supporting “medical professionals and scientists in preventing, healing and easing diseases” [7] by application software, the distinction between application software components and medical devices is becoming more and more senseless. This is not only evident for Picture Archiving and Communication Systems (PACS), which are directly supporting medical diagnostics and therapy, at least in parts. Distinction is also fading for software in intensive care units and even for electronic health record application software. Consequently, the European Union has included those software applications into the regulations on medical devices. Kaiser et al. point out that these regulations will change the role of IT-departments even in small hospitals: they will become operators of medical devices and thus they will be faced with new and strong responsibilities [13]. Hopefully these responsibilities will not result in major drawbacks for patients. Researchers and practitioners in Europe should cooperate closely to find appropriate ways to handle these challenges.

If software controlled medical devices like lung ventilators or syringe pumps are an integrated part of a hospital information system, they have to be integrated in its networks on a physical layer. This leads to medical information technology networks (MITs); respective norms apply and require a special risk management. Ahlbrandt et al. analyze the norm IEC 80001-1 and recommend to subdivide the hospital’s network into subnets according to functional and organizational requirements but to define one person responsible for risk management of the entire network [14].

Especially the demand for risk management of MITs makes clear that management of hospitals’ information systems has to be embedded into the overall hospital management and to be aligned with the hospital’s strategy. We can transfer these considerations to a national level and look at transinstitutional health information systems. Hussein and Khalifa worked out that a national eHealth strategy is essential
to overcome a patchwork of many different eHealth projects and to achieve a telemedi-
cine infrastructure for all [15]. They pre-
sent a comprehensive and systematical Strengths, Weaknesses, Opportunities, and
Threats (SWOT) analysis of the current telemedicine applications in Egypt. Ac-
cording to the WHO’s 2005 eHealth resol-
ution [16] the authors’ demand for a na-
tional eHealth strategy is not only im-
portant for developing countries.

High quality patient care needs eco-
nomically sound usage of resources. The
term ‘high users’ refers to patients, who ac-
count for a high amount of health care ex-
penditures. In many cases high expendi-
tures could be prevented if high users would be detected very early and the dis-
ease progress could be deescalated. Hart-
mann et al. reviewed current literature to find appropriate models for predicting
high users [17]. They found suitable meth-
ods which have to be selected depending on research questions, aims, and data. For
Germany they recommend the use of sec-
ondary data of health insurance com-
panies.

Claessen et al. pick up the idea and use the claims database of a big German health insurance company to analyze the impact of diabetes on the mortality of stroke pa-
tients. Even though routine data are not collected for research and may lack rel-
ificant information it could be used to con-
firm a time dependent mortality risk of diabetes following first stroke in men [18].
This paper shows how important the co-
operation between epidemiologists and
statisticians is [19]. The second paper of
Scherag discussed gene-environment inter-
actions in the context of genome wide as-
sociation studies (GWAS) [20]. He ad-
dressed the phenomenon known as “miss-
ing heritability” by citing an example of
variants that have been shown an effect on
the body mass index in GWAS, but this ef-
fect is attenuated in physically active indi-
viduals. Lotz et al. [21] analyzed measure-
ments that are subject to detection limits.
In some areas epidemiologists are quite
often confronted with outcomes that can-
not reliably be measured below a certain
threshold. Lotz and her coworkers demon-
strate that the multiple imputation ap-
proach and Tobit regression outperform
simplistic approaches.

We as the editors of MIJE hope that this
short introduction to current work on
medical informatics, biometry and epi-
demiology in Germany shows that the
fields are interrelated. Maybe the synergy
is inspiring for you and can lead to better
international cooperation to achieve good
information as a basis for good medicine
and good healthcare [8].

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