Medical student selection: the quest for the Grail

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Now in *Swiss Medical Weekly*, R. Krings et al. [1] present an article studying the value of high schools grades (Matura) in combination with the Swiss Aptitude Test in Medicine (EMS) to predict academic performance during the first three years of medical school in their own institution, using four cohorts. This *numerus clausus* approach to selecting candidates is used by the majority of medical schools in Switzerland, with a few others using the results of the first year of studying medicine, with or without a ranking competition, in order to select medical students without limiting initial admission to the university if basic criteria are fulfilled.

By using hierarchical regression analysis, Krings et al. found that high-school grades predicted the results of the first three years of medical school, whereas the EMS scores added no additional prediction every time Matura grades were included in the analysis. Being in a biology-chemistry major during high school was a predictor for better performance during the first study year in medicine. For the following academic years, previous performance in the medical curriculum was the best predictor for subsequent performance. The authors raise the importance of rethinking the admission process, while recognising some study limitations, such as a single-centre approach. In their opinion, future admission processes should better assess other competences such as communication, professionalism and interprofessional collaboration.

Krings et al. have to be commended for having analysed in detail this admission process, taking into account the sequential use of high-school grades and of aptitude test results. The study could not assess the impact of this selection process on behavioural dimensions and interpersonal competences. Nor was the study designed to predict clinical competences. Should we then get rid of the aptitude test if Matura grades suffice to predict initial academic performance? In theory, if the objective is to predict examination scores during the first years and if these results can be reproduced on a larger scale in Switzerland, this could be considered. Relying on Matura only may be appropriate if this diploma has similar value among high schools and among regions of the country, and if the grades show variability and no inflation. However, this may not always be the case and an additional or alternative selection method would probably be needed, first to make the candidates go through an equitable selection process and second to provide a mechanism for reaching the desired numbers of students. EMS may not offer immediate, additional predictive value, but may give a perception of face validity and increased acceptability, despite additional costs, thus providing medical schools with the desired number of students. Or are there alternatives?

A selection process is a necessary approach, in Switzerland as elsewhere, given the large number of candidates willing to enter medical schools, the limited capacity for training, and the finite desired annual number of new physicians in the country [2]. Beyond the political analysis to determine the right number of future physicians required to respond to society's needs comes the question of the philosophy and related methodologies of the selection process [3]. And here arises the quest for the Grail… Should we strive to select the best students or the best needed future doctors… [4]?

Many selection approaches have been used, each one with advantages and drawbacks, often hardly generalisable in different contexts and of variable predictive value, so that no single method has emerged. According to Patterson et al. [3], the majority of medical schools rely on previous academic achievements in their selection process and/or on specific admission tests assessing scientific knowledge, cognitive aptitude, or both (e.g., the Medical College Admission Test in the USA). The Swiss EMS does not test mere knowledge, but assesses some cognitive aptitude dimensions, such as the ability to elaborate knowledge from resources, apply logical rules, or concentrate and memorise, with an acceptable prediction of academic achievement [5]. As Krings et al. report, the EMS score alone was related to performance in the different examinations during the first three years, except for third-year OSCEs (objective structured clinical examinations), but did not predict success or failure of students.

Many institutions apply a selection philosophy aiming at predicting the non-cognitive qualities of future physicians, rather than grades during the years at medical school. They typically use, for example, interviews, multiple mini-interviews, or situational judgement tests [3]. Use of a non-grade-based system to select in or select out candidates would hopefully allow for more diversity of candidates and more representativeness of different socio-cultural backgrounds. These tools are attractive, but their development and implementation often require a combination of different methods and significant resources [6]. The study of their predictive value suffers from several difficulties: varying definitions of the qualities of a good physician, choice of the measured outcomes, interrelation among sev-

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eral combined or sequential selection approaches, and influences of the local population and culture preventing generalisability. As a consequence, a selection process should be validated locally and cannot necessarily rely on international data [3]. Additionally, demonstrating or not demonstrating expected characteristics at the (young) age of entrance to medical school does not necessarily take into account personal spontaneous development and increased maturity during the following years, as well as environmental influences, such as clinical role modelling experienced by the students [7].

Given these difficulties, why not rely on chance to select medical students? Several years ago in the Netherlands, candidates were submitted to a lottery that in the 2000s became weighted for pre-university performance [8]. Because of perceived lack of fairness, this approach was progressively changed back to selection-based processes in 2017 [4, 8]. Very recently during SARS-CoV-2 pandemic, McMaster University had to replace a structured admission interview process with a partial lottery for health reasons [7]. Although randomness may be a way to insure equity and representativeness of different socio-cultural milieux, accepting randomness to be selected (or not selected) for the most desired professional, lifelong career path is, however, not easily accepted by the candidates and the public. There may be a sense of lost power and autonomy for high-stakes decisions [7], so that the perception of the validity and fairness of a selection method remains an important factor in making the argued approach of lottery less likely to be accepted [9].

After these observations, is then striving to find the best predictive tools to select students, including professional behaviours, the best option? Or should efforts rather be put into the conditions and quality of medical education and training, by offering feedback and assessment, using portfolios with mentoring, guiding career choices to reflect society's needs, taking into account local sociocultural issues, and training faculty members? This investment may offer some guarantee of leading students to the desirable level in the different roles and competences expected in a given context [10]. In this sense, admission criteria using high-school grades in combination with another approach (including randomness [7]), or based on the test results of a curriculum sample [11], or on results and ranking at the end of the full first year of authentic and relevant biomedical teaching, including societal aspects [12, 13], may represent acceptable alternatives before pursuing training. These alternatives may be used until more comprehensive, locally validated selection processes are accepted and implemented by medical schools. "Nature versus nurture"

[14], or perhaps finding the right balance between both approaches, is the unsolved fundamental question open to further research.

Disclosure statement

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