Review Article

Medical School Admissions: A Review of Global Practices, Predictive Validity, and Practice Points for Africa.

Christian C Ezeala[1], Mercy O Ezeala[1], Vaseem Shaikh[2], Tumelo M Akapelwa[1], Sam B Phiri[1], John A Mulemena[3], Festus Mushabati[1], Kingsley Kamvuma[3], Warren Chanda[3], Gibson Sijumbila[1]

[1]Department of Physiological Sciences,
[2]Department of Anatomy, and
[3]Department of Pathology & Microbiology, School of Medicine and Health Sciences,
Mulungushi University, Livingstone 10101, Zambia

ABSTRACT

Background: Processes for selection of candidates into medical schools vary globally. Knowledge of the predictive validity of a selection method is important for policy revision.

Aim: To survey the practices used by medical schools to select students and their predictive validity.

Methods: Search terms developed from the research problem were used to search Google Scholar, PubMed, and Educational Resources Information Centre (ERIC). These were "medical school," "predictive validity," "success," "academic achievement" "admission criteria," and "student selection." Retrieved articles were screened for relevance and sorted according to countries of publication. Authors narratively reviewed the articles from each country and collated the findings. Best practices were recommended for African-based medical schools.

Results: Articles retrieved from 14 countries were included in the review. USA, Canada, UK, Australia, and New Zealand operate centralized medical school admission programs and administer nation-wide admission tests. These tests cover cognitive and non-cognitive domains. The validity of these tests in predicting medical school success were extensively studied and reported. Other countries do not operate centralized medical school admission programs. Most of these rely on cognitive excellence to select students. Few reports are available on the validity of selection practices in Africa. Most rely on cognitive excellence which highly predicted academic success during preclinical studies. Predictivity decreased during clinical phases and non-cognitive variables became better predictors of success.

Conclusion: Medical school admission processes should consider cognitive and non-cognitive factors. With non-cognitive factors, candidates with right attitudes are selected. African countries should align their practices to that of Western countries.

INTRODUCTION

The selection of candidates for admission into medical schools is a subject of considerable discourse in literature. The criteria for this selection differ in different countries and is often determined by the medical programs' expectations from the

Corresponding Author:
Prof Christian C Ezeala DLitt et Phil, PhD.
School of Medicine and Health Sciences
Mulungushi University Livingstone Campus
Livingstone 10101, P. O. Box 60009, Zambia
Email: christianezeala@yahoo.com.au
ORCID: https://orcid.org/0000-0002-1117-1089

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candidates. Medical education is exacting, and successful completion of medical training and subsequent transformation into a compassionate healthcare professional requires a high level of cognitive ability integrated with significant elements of non-cognitive skills. Medical schools are therefore concerned about selecting the best candidates who can complete the rigorous medical education and develop into competent practitioners with the requisite skills and personalities.[1,2] In many cases, medical schools structure the admission processes to align with their social missions.[3-5] While some institutions base their students' selection on cognitive excellence only[6], others consider additional factors such as age, prior community experience, interpersonal skills, and leadership potential.[7,8]

In many countries, the basic requirement for entry into undergraduate medical education is the General Certificate of Secondary Education (or its equivalent). Passes in the appropriate subjects at ordinary and/ or advanced levels are required. In some settings, admission into medical education programs requires successful completion of a relevant first degree. Also, while some universities base student selection on school exit examination results only, several others require additional university/medical school entrance examination test.

Scholars continue to analyze the predictive validity of admission processes for success in medical education and professional practice. The analyses prove to be valuable indicators for sustenance or change in admission policies. Recent literature shows plethora of publications on the validity of the diverse selection criteria. Majority of these publications reported on studies that used quantitative analysis of the correlation between entry scores and academic achievement. While some studies showed that entrance scores highly predicted success, others did not find any significant correlation between entrance criteria and success in medical school. Another issue is that the definitions of academic achievement varied in these reports, making it difficult to compare the different studies.

Furthermore, correlational analysis of cognitive achievement left out an important aspect of medical education, the transformation of the learner into a professional caregiver, whose competencies are expected to go beyond cognitive excellence. Other desirable qualities are empathy, professionalism, team spirit, and ethical conduct. The paradigm has therefore shifted in many countries and student selection now include consideration of non-cognitive factors.[9,10] This practice is well established in Western countries. Several studies also reported on the validity of non-cognitive factors as predictors of success in medical education.[2,11] The aim of this review was to examine current medical schools' admission practices globally and determine the validity of selection criteria used.

METHODS USED FOR RETRIEVAL AND REVIEW ARTICLES

Search terms where formulated from the research question: 'What is the predictive validity of selection criteria for success in medical education?' The search terms included “medical school,” “predictive validity,” “success,” “academic achievement” “admission criteria,” and “student selection.” The databases searched were Google Scholar, Educational Resources Information Centre (ERIC), and PubMed. The search terms were iterated to achieve maximum article retrieval from the databases. To review articles that reflected global picture on the topic, members of the study team were assigned articles retrieved from specific regions to analyze and produce narratives on the selection practices and reported validity of selection procedures. The lead author collated and integrated the submissions from team members and wrote the manuscript's draft. Team members reviewed and agreed on the content of the manuscript before it was referred to the language expert in the team for language proofing.

GLOBAL PRACTICES

Relevant articles were retrieved from North America (USA and Canada), Europe (United Kingdom and Germany), Asia (Nepal, Pakistan, and Malaysia), Oceania (Australia, New Zealand, and Fiji), and sub-Saharan Africa (Nigeria, Kenya, and South Africa). Medical school admission practices in these countries are presented below:

North America (USA and Canada):

In the United States and in some medical schools in Canada, medical education is conducted at the postgraduate level and entry into a medical education program requires possession of a first degree with an acceptable cumulative grade point average (CGPA). In addition, the candidates sat for and obtained acceptable scores in the nationwide Medical College Admissions Test (MCAT).[2,12] Some Canadian medical schools conducted individual admission exercises using a variety of processes, however, recent efforts tended to harmonize admissions into Canadian medical colleges.[13,14]

MCAT has undergone five revisions resulting in six versions over a period of 87 years. The latest revision was driven by the goal to achieve a diverse physician workforce and ensure social inclusiveness across socio-demographic backgrounds. The latest of these versions was launched in 2015, and several reports analyzed its validity and usefulness in achieving diversity and inclusivity.[11,17,18] MCAT measures competencies in four domains: 'chemical and physical foundations of biological systems (natural sciences), critical analysis and reasoning skills, biological and biochemical foundations of living systems, and psychological, social, and biological foundations of behaviour'.[19] Selection depends on a balance between the domains and consideration for diversity in the students' population.[16]

Europe (UK and Germany):

The basic requirements for admission into universities and medical schools/ colleges in the United Kingdom are credit level passes at the General Certificate of Secondary Education ordinary and advanced levels. Until 15 years ago, there was no uniform university or medical school admission test as is applicable in the USA. Individual medical schools selected their students considering both cognitive and non-cognitive variables.[20] The UK Department of Health determined the number of students admitted to the colleges. However, in 2005, a consortium of top UK medical schools established the UK Clinical Aptitude Test (UCAT, formerly UKCAT) to assist in selecting the best applicants for their medical and dental programs.[21,23] The UCAT test comprises multiple choice questions in 5 subsets: "Verbal Reasoning," "Decision Making," "Quantitative Reasoning," "Abstract Reasoning," and "Situational Judgement."[23]

A topical issue in UK admissions is the inclusion of ethnic minorities and students from poor socioeconomic backgrounds.[22] The expectation is that this will create a diverse physician workforce that would be relevant to the healthcare needs of the country. There are several reports on the predictive validity of the UCAT. The majority claim that the selection criteria positively predict medical school achievement. Some studies focused on the usefulness of non-cognitive variables.[24,25]

In Germany, medical school admissions are managed by the Central Office for the Allocation of Places in Higher Education (ZVS). Germany uses performance in the General Certificate of Aptitude for Higher Education as the criterion for admission into universities. This measures cognitive excellence. Admission quotas are reserved for the military and international applicants. Strauss and Brähler earlier suggested that the General Certificate of Aptitude for Higher Education was the best predictor of success in medical education in Germany.[26] However, later studies indicated that it did not significantly predict academic success in the first year of medical education.[27]

Oceania (Australia, New Zealand, and Fiji):

Based on student admission, Australian and New Zealand medical schools can be grouped into 3 categories. These are those running graduate-entry programs only, those running school leaver-entry programs only, and those using both forms of admission (mixed entry). The selection criteria include prior academic performance such as matriculation scores or GPA, aptitude tests, and selection interviews. Schools aim to select their students based on varied suitability criteria which included cognitive excellence, non-cognitive factors such as empathy, kindness, team spirit, and respect for others, creating wider access for underprivileged candidates, and meeting the schools' social obligations.[28,29] At one time, a consortium of medical schools in Australia collaborated with the Australian Council for Educational Research (ACER) to introduce the Undergraduate Medical and Health Sciences Admission Test (UMAT), used to select students into medical education programs.[30,31] Similarly, the Graduate Australian Medical Schools Admission Test (GAMSAT) was established to select students into graduate-entry medical schools.[32] Some studies reported on the validity of the tests administered by these organs and their reports showed positive predictivity for medical school success.[33] UMAT was discontinued in 2019 and replaced with the University Clinical Aptitude Test (UCAT) to manage medical schools' admissions in Australia and New Zealand. One study from Fiji indicated that the Form 7 score (the secondary school leaving certificate) correlated well with success in medical education.[6]

Asia (Malaysia, Nepal, and Pakistan):

In Malaysia, The Ministry of Higher Education is responsible for the initial selection of students for medical schools. Performance in the Malaysia School Certificate (MSC) examination determines eligibility. Further processing follows two distinct tracks: Matriculation track and the High School Certificate (HSC) track. Matriculation is a one-year pre-university program whose curriculum differs from that of the HSC, which is a two-year pre-university program.[34] Some medical schools also incorporate multiple mini interviews (MMI) to assess non-cognitive variables as part of the selection process.[35] Several studies evaluated the validity of student selection processes in Malaysia and reported positive correlations with medical school performance.[35,36]

Admission into medical schools in Nepal requires possession of good grades in the grade 10 and grade 12 examinations. Individual medical schools conducted entrance examinations which they give prime consideration. One validity study[37] who reported that college scores had no significant correlation with medical school entrance test scores, but that college scores were better predictors of medical school success than entrance scores. Reports from Pakistan and Saudi Arabia showed that school certificate grades predicted academic success only in the early years of medical education.[38,39,40,41]

Sub-Saharan Africa (Kenya, Nigeria, and South Africa):

In many African countries, medical schools base the selection of their candidates on the old colonial vestigial philosophy that uses only cognitive excellence. This is because the then Western ideology dominated the establishment of the first-generation universities. Western education has since advanced through major innovations in teaching, learning, and assessment methods. However, socioeconomic and political constraints restrained African higher educational institutions from keeping pace with the developments in the West.[42] Medical schools in many sub-Saharan African countries do not use centralized admission programs or special admission tests for student selection.

In Kenya, the Kenya Universities and Colleges Central Placement Service (KUCCPS) is responsible for primary selection of students into

medical schools based on performance in the Kenya Secondary Schools Certificate Examination (KSCE). Medical schools may also select students through the Self-Sponsorship Program (SSP). One study evaluated predictive validity of the O' Level KSCE certificate scores and found that it did not predict medical school academic performance.[43]

Nigeria adopted centralized university admission through the establishment of the Joint Admission and Matriculation Board (JAMB) in 1978. This board harmonized university admissions nationally. The processes, scope, and nature of JAMB assessments have undergone considerable changes since JAMB was established. Current selection requirements into Nigerian universities include a combination of O' Level credit passes in the Senior Secondary Certificate Examination (SSCE) or the equivalent such as West African Schools Certificate/ GCE examination, with success in a JAMB organized Unified Tertiary Matriculation Examination (UTME), and Post -UTME tests administered by individual universities.[44] The validity of these selection processes were studied by several authors who independently concluded that the combination of UTME and SSCE effectively predicted academic success in the first two years of medical education, and that the school's certificate scores were better predictors of success.[45,46]

In South Africa, individual medical schools select their students using a combination of the National Schools Certificate (NSC) and National Benchmark Test scores.[47] The schools also consider non-cognitive measures including personal attributes, socioeconomic status, race, and gender. The validity of these measures for medical school success were studied and the results indicated that the NBT reliably predicted success in medical schools.[48,49] The reports recommended that NBT should be given equal weighting to NSC in medical school admissions.

SUMMARY OF GLOBAL PRACTICES

Medical schools in many countries of the world rely on measures of cognitive excellence for the selection of their students. Many studies evaluated the predictive validity of the selection processes by measuring the correlation between entry scores and performance in medical schools. The school certificate and medical school entrance test scores highly predicted medical school performance in the preclinical years. This predictivity became weak in the clinical years, and non-cognitive variables appeared to be better predictors of performance. Apart from medical schools in North America, Europe, and Australia, most medical schools do not give significant weight to non-cognitive variables in student selection. As such, candidates selected for medical training may not possess the personal qualities that are critical to successful medical practice. Also, the schools may not meet their social obligations of providing access to underprivileged candidates and ensuring diversity in the health workforce may not be achieved. Many African countries do not have centralized admission systems for medical education. Individual medical schools select their students based on their predetermined criteria. Such criteria may not reflect the social mission of these schools.

PRACTICE GUIDELINES FOR AFRICAN MEDICAL SCHOOLS

From the foregoing discussions, many African countries lack centralized medical school admission processes. Most first-generation medical schools still cling to the inherited post-colonial practices that uses secondary school certificate as the only parameter for candidate selection. African medical schools should consider personal qualities and sociocultural factors in the selection of their candidates. Information on the predictive validity of selection processes into medical education in African countries is limited. Medical schools should encourage evaluation of their selection tools to generate the much-needed evidence for policy shift. Selection practices should be reliable, transparent, evidence-based, and unbiased. In this way, the schools will gain and sustain the trust of stakeholders.

The key points of this recommendation are listed below:

- Medical schools should periodically review the processes for student selection in fulfillment of the World Federation of Medical Education global standards for basic medical education section.
- Medical schools' selection criteria should be effective in predicting success during medical education and after graduation and licensure. To this end, excellence in secondary school grades and university entry scores should always be emphasized.
- Selection of students should be based on a variety of assessment procedures to maximize the possibility of choosing the best candidates with respect to cognitive and noncognitive qualities and promotion of social inclusion.
- Selection instruments should incorporate significant elements of non-cognitive measurements to select candidates that can effectively transform into competent clinical practitioners with the right personalities.
- Selection instruments should be aligned to the social mission of medical schools and the national need for diversity in the physician workforce as well as granting access to candidates from underprivileged backgrounds.

AUTHORS' CONTRIBUTIONS

All authors contributed to the conceptualization and design of the study.

All authors contributed to literature search and narrative review of the retrieved articles.

The leading author (CCE) wrote the final manuscript

MOE did language editing on the draft

All authors read and approved the final copy of the manuscript

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