



Research Article

The Sudanese Medical Education in the Light of Flexner Report

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Abstract

Medical education as a profession is a legitimate offspring of Flexner's report in 1910. It strived to excel in preparing future doctors and increasing the competency of medical practitioners. We provide a scientific critique of Flexner's report, displaying its merits and shortcomings and shedding a spotlight on Sudan's medical education milestones and its current strive for excellence and innovation in curricula designing, accreditation, graduate competencies, staff professional development, and quality improvement. Since the publication of this inspiring study, a global effort has been launched to improve the quality of health system policies and health professions' competency through education. All stakeholders now seek fundamental reform in medical education in Sudan to improve its quality and trustworthiness. Based on this study, our impost does not necessarily propose following its footsteps but instead evaluates its stimulating role in planning and intervention.

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1. Introduction

This article tries to shed light on the history and current status of medical education in Sudan, using Flexner's report as a model. It might be a redundant idea and published frequently; nonetheless, different opinions and point of view are additive to the subject.

The first recognized established hospital dates to the 6th century in Persia [1]. This consideration entrenched the concept of the medical corporation. Doctors used to visit the patients in their homes, as there was no dedicated place for treatment or isolation of sick people. At the dawn of the 8th century, the first Islamic Bimarstan was established in Damascus [1]. As a result, hospitals were recognized as centers for treating patients and training doctors.

Formal medical training in America dated 200 years before Flexner's report through apprenticeship, which lacked uniformity or standardization. The first traditional medical teaching was recorded in 1750 [2]. John Morgan started a formal medical training

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practice back in 1765 in a Philadelphia hospital. Thomas Bond (1841-1901) defended the notion that didactic teaching is not enough to prepare doctors for clinical practice, and that they should have supervised bedside training [2].

The first recognized medical school in sub-Saharan Africa dated 1896, in Madagascar (Universite d'Antananarivo). The sum of recognized medical schools in sub-Saharan Africa before 1950 reached 13; in the 1980s, the number increased to 51 [3]. The University of Khartoum, the first Sudanese School of Medicine, was established in 1924 before the declaration of independence from British colonization. In the middle east, the first medical school was found in Beirut in 1868 [4]. The first established medical school in Egypt was *Kasr Al-Ainy* in 1872, followed by Alexandria a century later [5].

Flexner was a Latin and Greek graduate from John Hopkins after attaining a master's degree in education. Based on his brother's background in medical training, Flexner was influenced by the Dutch style of medical education, and he tried to mirror John Hopkins's practice in the American and Canadian medical schools. John Hopkins still reserves a pioneering status as a private research-oriented educational facility.

Flexner's observations aimed to repair deficient formal training and introduce evidence-based practice on the conscious decisions of graduates. A track-centered practice was encouraged by some institutes [2]. J. Newman pioneered a leadership concept for universities complemented by the community [2], which became an integral part of medical curricula.

The Carnegie report was a milestone in the development of medical education in the USA and Canada. However, this has been pursued as a continuous endeavor for amendment and correction [6]. The impact of this report resonated globally, creating a motion to generate invigilating organizations to maintain quality and excellence in medical schools [7]. The global result of the report is rooted in its sweeping outcomes on American and Canadian medical education and the political role of North American countries at the inception of the last century.

2. Materials and Methods

The Carnegie (Flexner report), which was released in 1910, is carefully analyzed, with emphasis on its most contentious points and contemporary subjects. The critique reflects the authors' observation, striving to maintain a scientific, non-biased approach by supplementing information collected from public press and scientific journals published in the last three decades.

3. Discussion

3.1. The impact of Flexner report

3.1.1. Dual phases in medical schools (preclinical and clinical)

Flexner's background as an educator and school principal amended his visits to 155 medical schools around America and Canada to critique the curriculum, infrastructure, students, and teaching methods. He recommended separating teaching in medical schools into two phases; the preclinical phase, where basic medical sciences essential as a foundation should be taught, and the clinical phase where bedside training will be covered. Due to his academic background, he encouraged adding laboratory training to study medicine.

His approach has been challenged by new educational theories that advocate for an integrated medical system in which clinical sciences are taught alongside basic medical sciences and clinical correlations. In terms of delivering knowledge to students and capturing their attention with intriguing relevant clinical problems, integration proved superior to traditional teaching. This approach helped a lot with the expanse of knowledge beyond the capacity of the four-year proposed program to cover. It is advised that basic sciences relevant to clinical practice be thoroughly covered while skimming over irrelevant facts.

Medical education is now concerned with all facets of learning processes, post-graduate specialty training, professional development, continuous training, and competency exams for registration and license renewal. The scope of medical education has been broadened to include all aspects of the healthcare system.

Many medical schools are now abandoning the classical ologies system in order to favor the integrating-based curriculum.

The level of integration and its efficiency varied widely based on variants of educational theories [8]. The integrated module system needs to be supplemented by an adequate staff, an apparent inadequacy deterring its proper application. The integrated approach proved to be superior in information delivery and retention. Affiliation and partnership of medical colleges with well-established local and regional institutes with the conjoint utilization of resources and consultation services are advisable solutions. This was reflected in the partnership between well-established institutes and newly emerged ones in Sudan, which helped develop and sustain these institutes.

The longitudinal integrated clerkship (LIC), a clinical education model based on the ideas of social cognitive theory and contextual learning [9], this model's framework intentionally creates ongoing ties between faculty, students, and patients, improving student discipline, moral conduct, and professionalism [10].

Many pioneering medical institutes in Sudan have the capabilities to pursue this with an arsenal of teaching hospitals and available staff.

Designing integrated courses is approached differently by many institutes; some are clinically integrated from the get-go, and some integrate only in phase two; some institutes integrate conceptually by providing didactic knowledge with simulation in the pre-clerkship phase and introducing clinical rounds with actual patients later, now the trend is to integrate clinical practice in LIC schemata; as we used to say to our students "we are treating patients, not diseases."

Unfortunately, we all recall patients' frustration when they wander between departments seeking multidisciplinary inputs to their ailment; students undergoing LIC can follow patients through their weekly rotational activities in multiple clinical specialties. LIC is regarded as a motivator in engaging students in the learning process, and vividly educates the mind to use rationally allocated basic science information, abilities, and attitudes to serve the primary objective of safe and efficient clinical practice [11].

During the COVID-19 epidemic, the LIC, according to Desai, was an unexpected godsend since academic calendars were barely disturbed compared to traditional clerkship curricula [12].

In Sudan, the LIC concept is proposed and contemplated by many institutes but not yet approved by the curriculum committees, as it requires a tremendous organizational effort to allocate training posts and assign clinical supervisors.

According to one of the LIC students, his pediatric rotation of one-year duration consisted of working in the same clinic. "I completed newborn checkups as well as child visits for the same patient at 2, 4, 6, and even 9 months of age." [12]. This constitutes only a glimpse of a herd of benefits potentially attained in LIC.

3.1.2. A scientific approach to study medicine

Flexner commends the German style of medical education, reflected in the John Hopkins School of Medicine. This approach entertains extensive laboratory training for the students. Medicine mainly stood over the centuries as a profession-only practice, and

the scientific part was mostly ignored. Flexner validated evidence-based medical training and practice and encouraged research in esteemed medical schools for emerging social health issues as a part of accreditation requirements.

3.1.3. Competency of the graduates

Assuring that all minimum sets of resources are made available in medical schools can help in validating and testing the competence of the graduates. Flexner was not a doctor, albeit his brother was; his background endorsed the report even more because this is an insight of an observer who does not have a biased judgment, and his realizations and conclusions had been based solely on careful surveillance of the system layout, not the content. Readers of the reports will realize that Flexner did not use either a written questionnaire or a checklist in his report. He based his data mainly on adaptive scrutiny, which may strip his reported data from some creditability.

Harden proposed his SPICE [13] model of medical education that is student-centered, problem-based, integrated, community-based, elective, and systematic in contrast to the old-fashioned traditional medical education that is teacher-centered, rote learning-based, discipline-based (ologies), hospital-based, standard, and apprenticeship based.

Medical education in Sudan is currently undergoing transformational trends toward competency-based curricula; in his proposal for competency- or outcome-based curricula in Sudanese medical education, "Sudan Meds," Dr. Abdullah attempted to replicate Canadian and KSA experiences [14].

3.1.4. Learning resources

Flexner surveillance visits focused on the capabilities of medical schools to provide proper training for students. He critiqued profitable medical schools and advised governmental schools to allocate an ample budget for establishing good training and progress. He recommended the allocation of some poorly installed institutes for the training of black or female doctors, reflecting America's prevailing segregation politics in the last century.

Now we have many learning resources, including simulation and electronic libraries. Laboratory-based training in developing countries suffers significantly from the lack of resources; Mohammed *et al.* strengthened the utility of laboratory training in medical schools [15].

Simulation is now widely introduced as an indispensable resource in medical education for training undergraduates and postgraduates. Mannequins currently use sophisticated software and sensors to deliver a realistic experience for students. More IT companies need encouragement to invest and invent in this realm to increase diversity and lower costs [16].

The simulation problem includes depersonalization of the teaching experience and its steep cost and required maintenance. No doubt, their capabilities of mimicking symptoms and signs with rebound fidelity are cherished.

Sudan indeed lagged in many of these essential learning resources, but students' accessibility to hospitals and patients compensated for these inadequacies. An alternative solution in Sudan is to provide collaborative simulation centers, which are utilized by many medical colleges to circumvent budget constraints.

Online educational platforms and virtual classrooms have been around for about two decades; the COVID-19 pandemic forced us to utilize these platforms intensely. Online learning platforms need reliable infrastructural elements [17–19].

Its advantage can be transferred by providing an experienced educator for large numbers of learners beyond the boundaries of place and time. These platforms lack active engagement, but are ever-evolving, and programmers solve many problems. This method of education proved to have paramount importance during the COVID-19 pandemic for continuous professional development and post-graduate programs.

The instability and insufficiency of well-established e-learning tools and infrastructure in many medical institutes in Sudan drastically hindered medical education during the unsettled political status and COVID-19 pandemic [20].

During the late 90s, the faculties of medicine at Khartoum and Gezira supervised an educational network providing plenary lectures to outreach and newly established institutes. For the lack of continuous support and development, these activities ceased to exist despite the tremendous technological advancement in Sudan.

3.1.5. Accreditation of medical schools

Flexner focused on the selection criteria of students, schools' resources and financial plan, and affiliated training hospitals in his nationwide visits. Following his study, a government initiative was launched, and almost half of the institutes were ruled incapable of teaching medical students. Some of these institutes have been dissolved, some have been combined, and some have been excused from being in sectarian zones or scattered for training black physicians or women. This was the first considerable

countrywide accrediting procedure for medical schools. This ground-breaking approach was quickly implemented globally to ensure the aptitude and skill of medical schools and practitioners.

Akpa Gbary *et al.* stated that accreditation of African medical schools is not frequent or thorough. Many institutes proved to have poor curricula and ancient laboratory settings [21]. Without international (World Federation of Medical Education) and regional (African Conference of Deans of French-speaking Medical Schools (CADMEF)) exchange of experiences and collaboration, with the provision of at least one accreditation procedure per decade, many inadequacies may pass unnoticed with significant catastrophic deterioration of the health system.

Galina *et al.* displayed in the WHO-WFME report that there are around 442 schools in Europe and that only Western European medical schools comply with European Union standards. An Italian initiative for EU medical schools started in Bologna in 1999 and culminated in the "Tuning educational structures in Europe" pilot in 2000 for medical school accreditation. Ghanim *et al.* quantified about 214 medical schools in 22 eastern Mediterranean countries in 2004, and the majority are now recognized by the WHO's World Directory of Medical Schools.

In Sudan, the educational revolution in the 90s was followed by a massive expansion of the number of medical schools and was recently shadowed by the expansion of private medical schools. The Sudan Medical Council faces a significant burden in ensuring the competency of both medical schools and graduates. This summoned a common thought nowadays by medical educationists "A Time for Evolution"!

Dr. Tahra identified three significant milestones in Sudanese medical education: the founding of Kitchener Medical School before independence in 1924, the formation of district medical colleges (Gezira and Juba) in 1975, and the Education Revolution Phase in 1991 [22]; undoubtedly, these pioneering colleges are leading the way in regional medical education. The fourth stage, which is marked by the establishment of dozens of private medical schools, is worth mentioning; according to the 2021 guide for university application, the number of medical colleges has reached 51 [23], which reflects a global trend occurring in India [24], the United Kingdom and the USA [25, 26].

Continuous professional development and workshops centered on relevant medical educational issues are frequently carried out at institutional and national levels in partnership with Khartoum and Gezira Educational Development centers (EDC) [27].

The Sudan Medical Council (SMC) was established in 1955, and it was granted "Recognition status" as per the regulation of the World Federation for Medical Education (WFME) in 2018 [28].

The Sudan Medical Council's key responsibilities as part of the accreditation process are to "defend, promote, and preserve" quality and safety for graduates and the community. It focuses on nine parameters that must be met [29,30]. The National Commission for Academic Accreditation and Assessment (NCAAA) in Saudi Arabia provides a comparable checklist [31].

3.1.6. Private school and profitable organization

Flexner advised for the closure of private and profitable medical schools, which might be a justifiable necessity in the pre-World War-I era. Now the number of private medical schools is on the rise, and capitalism forces even governmental schools to economize their spending and pursue a profit-based administration style. There is no conflict between maintaining the quality of medical education and profitability. Unjustifiable expenditure on healthcare facilities and medical education necessitated interventional measures to be applied, as demonstrated by the KSA experience [32].

Now in Sudan, there are almost 51 private and public medical schools; this trend followed the void in the middle east employment posts, mainly in Gulf Countries, as the fraction number of graduates who succeed in granting a job in Sudan is only marginal. Under the control of the Sudan Medical Council accreditation process, many of these schools attained decent standards, notwithstanding many are lagging.

With the emergence of many private medical schools' admission policies became less stringent [33]. Some claim private schools are more concerned about students' affordability than integrity.

The provision of continuous funding in medical institutes is a prime function of the government in governmental institutes. Private institutes need to tackle their resources and wisely spend on their requirements with their prospect focused on the return of the revenue. The international economic crises forced many institutes to shrink their staff members or put the load in students' behalf by either increasing the tuition fees or the number of recruits. An advised solution is to create other funding resources and profitable revenues [34].

3.1.7. Racism

The report implicitly suggested promoting the medical practice in America and Canada to decrease the number of colored candidates! [35]. In Chapter XIV (pages 180-181), Flexner brightly exposed the racist behavior of the American community back then.

Black doctors should only treat the black community was his prevailed suggestion in his report [2]. Even accepted black candidates, in his opinion, should endure nonsurgical-focused training. Another foul statement implies even worst intentions: black candidates' numbers should be kept to the minimum, trained differently, and treated differently, compared to their fellow white graduates [2, 36].

The UK premier football league logo is "NO Room for Racism" and is promoted worldwide via their broadcast [37]. Many international teaching and employing organizations declare this statement during recruitment processes.

In Sudan, since the independence, reserved seats in medical schools have been assigned to candidates from under-resourced remote areas to distribute opportunities to foster development in these locales fairly.

Racism and favoritism no doubt deterred the development of medical education and practice in Sudan and Africa. For many reasons, no factual data or investigation briefs regarding racial and gender bias are disclosed in Sudanese scientific literature or public press.

3.1.8. Female education

Sudan pioneered medical teaching for women in the region; Dr. *Khalida Zahir* (1927–2015) [38] and Dr. *Zarouhi Sarkissian* [39] (Thuraya Mohamed Saad- after conversion to Islam 1960) (1926-1982) were the first female graduates from Kitchener Medical School (University of Khartoum) in 1952. Both were social activists who participated in community development and fought for female rights. The law in Sudan gives women the right to equal pay and a 25% seat share in the parliament.

The share of accepted female candidates in medical schools in Sudan reached 69.5% in 2012 [40]. This implies that the majority of medical professionals in the upcoming years will be female!

Furthermore, a Sudanese School of Medicine for women was established in 1990, after the inauguration of Ahfad Public University in Omdurman by Badri in 1966, and has graduated many eminent female physicians [41].

3.1.9. Educator vs. practitioner

One of the recommendations of Flexner is that medical educators should exclusively devote themselves to teaching. This is refutable in modern practice, as it has been attested that a good practitioner is a good teacher. This statement is valid in other

disciplines; nevertheless, medicine is a scientific profession, and both sides of the coin should be considered. No one would like to be taught by someone who has never been exposed to patients or rarely does. This issue may further exacerbate the impact of an overwhelming number of non-medical scientists who teach fundamental medical sciences due to medical graduates' lack of passion for these basic medical scientist careers. Ashraf overtly expressed the adverse effect of the participation of non-medical staff in medical education in Pakistan [42]. The same motion happened in Sudan during the 90s, with the vast expansion of the number of medical schools. Omdurman Islamic University took the initiative and launched a program for graduating nonmedical basic medical scientists. Many graduates found themselves straying and unwelcomed in many medical schools, which forced them to enroll as students in MBBS programs, and often concomitantly teach at the same institutes.

Another good experience from Sudan was encouraging clinical specialties staff to have another degree in basic medical sciences. Some advocated giving incentives to basic medical science specialists to foster the poor offered salaries, as has been followed at the University of Khartoum, Faculty of Medicine.

Medical institutes should provide a hospitable working environment with space for professional development, continuous medical education, and research opportunities [43]. An educational facility that does not promote the carrier of its staff members often loses them for seeking better opportunities to satisfy their ambitions. Staff should be encouraged to publish in a rebuttable peer-reviewed medical journal as a professional requirement and actively participate in mentoring and guiding student research [44].

3.1.10. Osteopathy, psychiatry, and complementary medicine

Unfortunately, in Africa, social and religious beliefs encourage people to mainly utilize advice and recipes prepared by herbalists as the primary therapeutic option in 80% of the population [45]. Flexner recommended dismantling nonscientific approaches of medicine at that time: psychiatry, osteopathy, chiropractic, and complementary medicine. Some considered his observations to be a paradigm shift in these practices and caused an astounding adverse effect; on the contrary, others assert that his recommendations forced them to initiate evidence-based practices.

Complementary medical practices have become a sound, evidence-based profession in Eastern and Western countries. Acupuncture, osteopathy, and reflexology are now recognized and organized by accreditation organizations with the practice's required degree and license.

The trend now in Arabic and African countries is to formulate accreditation organizations for complementary health practices and offer training and reinforcement to practitioners and researchers to develop these realms.

Dr. Altigani Almahi launched the first psychiatric treatment clinic in Sudan in Khartoum in 1949 [18], a long time after the establishment of the Khartoum teaching hospital in 1904, which may reflect the delay of the emergence of modern psychiatry, mirroring what has happened in the USA and Canada. Undoubtedly, the vast majority of the population in Sudan relies on traditional healers and Shiek Roqia.

In Sudan, traditional healers and herbalists are not under the supervision of the ministry of health, and often quacks invade the profession and do profound harm to the community. Nongovernmental organizations in Sudan endorse continuous public awareness activities to increase awareness of these practices.

3.1.11. The Carnegie report stated, “fewer and better doctors” [2]

This approach is currently contradicted due to the insisting need of the communities for health promotion, especially in Africa and the Middle East. According to the World Bank, the number of physicians per 1000 in Sudan is 0.2618 compared to 4.6 in Germany. For the proper delivery of professional medical practice, the number of graduates should increase; adverse outcomes have been recorded with the association of low staffing. Zurn *et al.* explained in a WHO report two types of human resources shortages “Dynamic versus static imbalance” [46]. Sudan now suffers from the massive migration of brilliant, trained medical professionals seeking better working accommodation; consequently, despite the considerable number of graduates, our population is still underserved.

No compromise should be accepted regarding the quality of the education process and its graduates; with persistent exertion of inspection, we can grasp these far-fetched goals.

4. Conclusion

Sudanese medical education faced comparable milestones to the Flexner era. New challenges have emerged and addressed in Sudan, including distance learning, accreditation, and competency-based curricula reforming.

The pioneering impact of the Flexner report crossed the borders and resonated globally. The report is a milestone in medical education. It reflected the prevailing ideas in the last century regarding racism, and gender bias, which affected the social rights

of women and colored citizens. In Sudan, the relevance of these concerns should be addressed by providing a plausible solution.

A continuous endeavor has been set in motion globally since the emergence of this inspiring report to increase the quality of health system stringent policies and health professions competency through education. A significant revision in medical education status by all the stakeholders in Sudan to foster its quality and reliability is currently sought. Our reflection based on this report does not necessarily recommend following in its footsteps but instead considers its stirring role in planning and intervention.

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Ethical Considerations

None.

Competing Interests

Authors declare no conflict of interest.

Availability of Data and Material

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