

New trends in medical education

The clinical skills laboratories

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ABSTRACT

A clinical skills laboratory or center is a facility in which students, physicians, nurses and other health care professionals learn clinical, communication and information technology skills to a specified level of competence prior to or coordinated with direct patient contact. The purpose of the clinical skill laboratory is to support the acquisition, maintenance and enhancement of the clinical skills of students in health care professions. Within this non-threatening environment, patient volunteers, simulated patients, mannequins and information technology are employed to provide hands-on learning experiences for the practice of the essential clinical skills. The skills laboratory helps to ensure that all students have necessary learning opportunities and appropriate assessment and feedback before approaching real patients. As more and more schools integrate skills laboratories into their curricula, it is important to review this new trend, to introduce the reader to its nature, factors that led to its development, advantages and problems related to its implementation. This review will also suggest some guidelines that may help in overcoming the implementation problems.

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In recent years, many developments in health care delivery, medical and nursing education have led to the proliferation of clinical skills laboratories (CSLs) or centers in many schools. These labs have the advantage of being effectively used in the undergraduate and postgraduate education and continuing medical education (CME) and continuing professional development (CPD) in addition to other health specialties education. In CSL, a variety of standardized clinical approaches are used for students to receive complementary training in a systematic, safe and protected way, using effective educational strategies appropriate to their educational needs and level of experience.¹ Around the world, several medical schools and other health care professions have integrated CSLs in their curricula. Despite their recognition as effective educational tools, little literature is available on CSLs in

medical education. As more and more schools integrate CSLs into their curricula, it is important to review this trend, to introduce the reader to its nature, factors that led to its development, advantages and problems related to its implementation. This review will also suggest some guidelines that may help in overcoming the implementation problems.

Overview. A CSL is "a facility in which students and qualified staff learn clinical, communication, and information technology skills to a specified level of competence prior to or coordinated with direct patient contact".² The purpose of the CSL is to support the acquisition, maintenance and enhancement of the clinical skills of students in health care professions. They provide hands-on learning experience for the practice of clinical skills, which are deemed essential for effective and safe management of future patients. In

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addition, these labs help to ensure that all students have necessary learning opportunities and appropriate assessment before approaching real patients.³ Alternative names for CSL may be encountered in literature. These include clinical skills training facility, clinical skills center, clinical skills resource center, skills center, skills unit, clinical skills learning center and professional skills lab/laboratory. Clinical skill laboratories can contribute to several curriculum outcomes or competencies. These may include: communication and patient interviewing skills, physical examination, procedural and clinical laboratory skills, diagnostic and therapeutic skills, critical thinking, reasoning and problem-solving skills, professional attitudes and awareness of the ethical basis of healthcare, teamwork, organization and management skills.³ In addition, CSLs are also suitable for the enhancement of other skills such as research, critical appraisal, evidence based medicine, scientific presentation, information technology and computing. Dent⁴ identified 4 current emerging trends in teaching and learning in CSL which have implications for their future implementations. These include the expansion of delivery methods, adoption of educational strategies, provision of assessment opportunities and recognition of support mechanisms.

Clinical skills laboratory setting. Clinical skills laboratories are usually located within or near where patient care occurs. A typical lab has properly equipped seminar rooms, bedded ward area, special rooms for interviewing/consultation, procedure skills training, intensive care/resuscitation, networked computers with internet facilities, video cameras and microphones. A place for a simulated domestic environment is also required for the simulation of home health care visits. Clinical skills laboratories should be attractive and simulate a real clinic and ward environment. Corridor notice boards should enhance the teaching and learning opportunities by displaying electrocardiography interpretation, Basic Life Support and physical examination information. The facility's working hours should accommodate self-directed learning. The layout of the center should be suitable for large as well as small Objective Structured Clinical Examinations (OSCE) and other forms of clinical examinations. Depending on the level of training, skills are learnt and practiced on a variety of manikins and models, screen-based simulators, realistic high-tech procedures and interactive simulators. Simulation can include, but is not restricted to, arterial puncture arm, infusion/injection arm, blood pressure, eye retinopathy trainer, ear diagnostic trainer, airway management trainer, gyne-trainer, prostate examination, testicular self-examination trainer, breast examination, axillary lymph node model, male/female catheterization, spinal injection/lumbar puncture, central venous cannulation, heart catheterization simulator and other sophisticated simulators for advanced skills in postgraduate training. Cardiac simulators such as Harvey are useful tools for heart and vascular system

examination.⁵ Clinical skills laboratories also contain simulators for heart sounds/murmurs and breath sounds which are supported by a number of case histories and quizzes to test proficiency level. Video-tapes or CD ROM/DVD are valuable learning resources, which can be used on their own or in conjunction with other teaching materials. Computer based learning facilities and images slide bank of medical photographs, x-rays, and electrocardiographs are essential parts of any CSLs. In addition to these pieces of equipment, CSLs use human resources to facilitate and strengthen clinical skills. These include peers, students from other disciplines, simulated patients, real patients, volunteers and patient instructors/partners. Clinical skills teaching methods may vary. These may include didactic sessions, demonstration, case scenario, small group teaching, interactive sessions and role-playing. "SPICES" model is suitable for application when choosing educational strategies for CSLs depending on the specific objectives of each session. In this model, clinical skills teaching becomes more student-centered, problem-based, integrated, community-oriented, elective and system-based.⁶ Other educational strategies that can be adopted in the CSLs include self-directed learning, task-based approach, multiprofessional learning and outcome-based education. The size and nature of the CSLs determine the number of teaching, administrative and technical staff. Teaching staff can be a mixture of full time tutors to ensure continuity of the teaching program, and part time facilitators. Teaching staff can include people with expertise in medicine, clinical skills, communication skills, information technology, nursing and midwifery. Good management and quality improvement are essential for effective running of the CSL. A curriculum committee should have an active role in planning, management and ongoing evaluation of skills lab. The management team usually consists of an administrator, a secretary and technicians. The team is responsible for the daily running of the lab including scheduling, timetabling, examination arrangement, simulated and real patient banks, maintenance of equipment and budget preparation. Proper orientation, supervision, support materials and guidelines are helpful to CSL users to practice correctly and safely. A suitable system to ensure the CSL facilities security, safety and access should be part of CSL. The physical facilities, administration, organization and types of models used vary from one medical school to another. This variation depends upon the budget, the number of students and staff, available space, and local customs.⁷

Student assessment. Clinical skills laboratories can contribute to the assessment process by regular formative assessments and feedback, which helps in later summative assessment. In addition, CSL can provide a setting for OSCE.³ Clinical and communication skills are better assessed by an OSCE, which consists of a series of stations employing many educational resources present in CSL. The difficulties in the assessment of clinical competence are well

documented in literature.^{8,9} However, Dacre et al¹⁰ showed a 14% improvement in the skills of intravenous drug administration, assessed by OSCE, after 2 years of specific skills center training. Other powerful assessment techniques provided through CSL are self-videoing and feedback of patient interviewing. In this technique, the review of students' performance may be carried out through peer or facilitator feedback or by self-criticism.¹¹

Factors leading to the development of clinical skills laboratories. Early exposure to clinical skills and curriculum integration are educational goals recommended by major educational organizations in the world.^{12,13} It has recently been noticed that there is a decline in medical and nursing students' clinical skills.^{14,15-17} Concerns on the standards, variation and appropriateness of skills of the new graduates has also been raised.¹⁸ In response to the recognition of inadequate competence in clinical skills among graduates, many medical and nursing schools have changed their approach to clinical teaching accordingly.¹⁹ In the last decade, many educational institutions have now established CSLs while others are in the planning process. Clinical skills laboratories are in use at the University of Limburg at Maastricht, St Bartholomew's, Leeds, Dundee and Liverpool.^{18,19} Arabian Gulf University⁷ and United Arab Emirates^{20,21} have established CSLs while Saudi medical colleges are preparing for their establishment. Around the world, more emphasis is being placed on the quality of health services, medical education, reform and reorientation than ever before. Curricula have adopted more learning concepts, such as integration, self-learning, core curriculum concept, problem-based, community-based and outcome-based learning, communication skills, patient-centered approach, patient autonomy, better doctor-patient relationship, multiprofessional education and the development of technical, and transferable skills such as information technology and computer literacy. In addition, medical schools face many challenges to ensure that appropriate skills, values, and attitudes are properly transferred to students, as well as to guarantee that teachers are trained well enough to educate students and evaluate their performance objectively. The new development in modern technology employing sophisticated models, and simulation electronics helps with learning and evaluation of clinical skills. Other factors leading to this trend include the growing number of students, relative short supply of clinical materials, the declining number of inpatient beds, and shorter hospital stay. Gender separation adds to the burden on medical schools in which clinical teaching must be duplicated as must the hospital placements. There is often a shortage of teachers who also have different working practices, schedules, administrative and research duties, all which makes faculty supervision difficult. However, there have been changes in patients' attitude to doctors and their expectations of health care delivery. They are becoming more informed and more

conscious of their rights and the quality of health care given. They demand more comfort, safety and independence and therefore, object to being exposed to unskilled learners. Medico-legal considerations have increased with medical schools being held accountable for the undergraduate component of an individual doctor's training. Medical students used to learn both clinical and communication skills in patient care by observing and practicing on available patients. Although this is regarded as intrinsically more effective than lecturing, the opportunities for learning the essential clinical skills in this way for the reasons noted above, are no longer sustainable. Tutors also often encounter the problem of keeping track of students' progress, cannot provide proper supervision and give immediate feedback. In addressing these issues, the CSLs have increasingly become important learning resources, not only for undergraduates but also for postgraduate medical and nursing education² and CME/CPD.

Advantages and disadvantages. There are many advantages of CSLs. These include several issues related to convenience, coverage, relevance, integration, motivation, flexibility, evaluation and institution benefits. The convenience of CSLs can be demonstrated by preparing students for clinical practice without distressing patients,¹⁹ allowing students to learn at their own pace in a safe environment,¹⁹ allowing early practice of difficult, painful and embarrassing procedures in the safety of a supervised environment,²² providing enjoyable and valuable educational experience,¹⁹ permitting frequent rehearsal of a particular skill; and facilitating skills training prior to real patient encounter in hospital or community setting. With regards to coverage, CSLs can be used for the undergraduate and postgraduate health professions education and CME/CPD; cognitive, psychomotor skills and attitudes; variety of clinical skill, patient problems, professional and ethical issues,²³ range of learning approaches; educational principles (active learning, self-directed learning, feedback, reflection, and so forth); and real and standardized patients. The relevance of CSLs is related to their simulation ability of real medical practice and the application of new educational theories and strategies. Students can have better clinical skills dealing with common health problems, core and outcome competencies. Clinical skills laboratories can enhance professional development of faculty and community doctors.²³ Clinical skills laboratories provide an opportunity to integrate theory and practice; clinical, epidemiological and ethical; inter-professional teamwork,^{23,24} different educational methods, strategies and input; different clinical disciplines; and other clinical exposure in wards, ambulatory care, and other telecommunication links. In CSLs, students are better motivated. They would have more confidence in approaching patients, expressing their views and getting immediate feedback. Students' educational needs can be met, and their fear and anxiety of real clinical

encounter can be alleviated. However, teaching staff are better motivated to teach and train, and more satisfied with and welcoming towards prepared students in inpatient and outpatients facilities. Clinical skills laboratories give the educational program the flexibility in repetition of skills training as required; time and scheduling, electives and vacation working hours; more control on skills procedures; eliminate mistakes on patients or inconvenience to them; overcome social and ethical problems; self-learning and evaluation, meeting students educational needs; and facilitating interactive learning. Better methods of evaluation can be accomplished by using CSLs. These labs in their real practice simulation give more reliable and valid assessment tools. This can be achieved through standards against which clinical competence can be judged whether it is self, peer or institute assessment. There are many institution benefits with CSLs. These include: more time for research, professional development, educational management and other academic activities; source of income (utilization for internal and external CME/CPD activities); and facilitation of educational research in teaching and evaluation of clinical skills.²³ However, some disadvantages of CSLs have to be mentioned here. Skills which are not taught correctly will continue to be poorly practiced; if not well designed, clinical skills sessions may follow traditional education models and be stuck in time, place and content.²⁵ Peer physical examination may not be comfortable; cannot replace real clinical training; high cost of purchasing, maintaining and updating of materials and equipment; and stress on students, and anxiety as a result of unfamiliarity with this new educational approach.

Barriers to implementation. 1. Students: With a rising number of students, CSLs may not always respond to students' needs and may seem to make examinations irrelevant. 2. Staff: Resistance to change and a negative attitude, lack of CSLs awareness, inappropriate training, no clear roles or goals and lack of incentives. 3. Facilities: The cost of building and materials, and the cost of maintaining and updating equipment, unavailability of appropriate sized venue to accommodate increasing number of students, or the availability of the facility at specific time only, improper communication and coordination and lack of CSL integration into the remainder of the curriculum.

Guidelines for successful implementation. Recognition and acceptance of the importance of CSL in students' skills training by school authorities, staff and students are the first step in implementation. Appropriate planning, management and resources are also required to ensure proper setting-up. For academic and professional effectiveness, frequent and continuous evaluation, staff training and student support system should be part of CSL. A skill laboratory needs to be an integral part of the curriculum and relevant to education and training objectives. A successful CSL should be flexible and tailored to the local needs. Finally, schools

that are planning to introduce CSLs to their curriculum can benefit from visiting well-established CSLs for proper implementation.

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Related Abstract

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Abstract

Objective: To involve medical students actively in defining their learning objectives. **Methods:** Cohort of 51 medical students during their 6 weeks attachment to the Department of Family and Community Medicine King Saud University were asked at the beginning of the attachment to work out their learning objectives with the help u their tutors. Produced learning objectives were analyzed and compared to a similar study carried out in the U.K. **Results:** With 100% response rate a total of 418 learning objectives were identified by this cohort of students. In comparison to British medical students there were similarities as well as differences which may reflect environment differences. **Conclusion:** Recent trends in medical education emphasize the importance of active participation of medical students in the learning process. However, unless the environment is conducive students may be inhibited from taking the risk of change from passive absorber of information into active learner. Medical schools should adopt certain strategies which enable students to be active, self-directed and critical learners. In this way we can produce versatile doctors who could cope well with constant change. This study has shown that our medical students can be involved actively in identifying their learning objectives and, interestingly, they see primary care both as a useful and diverse source of learning for them.