

Role of Clinical Skill Centers in Undergraduate Dental Education: Stakeholders View

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Abstract

Background: The clinical skill center (CSC) offers an opportunity for students and working clinicians to learn and acquire clinical skills by using artificially simulated process, which will subsequently improve patient care and safety. To promote skill-based dental education, a CSC might be considered to incorporate in undergraduate dental education. **Objectives:** To explore the views of the stakeholders about the role of clinical skill centers in undergraduate dental education. This study also identified the effect of clinical skill training in promoting and maintaining clinical teaching.

Method: A cross sectional study was carried out among 637 dental persons in 11 dental colleges and units of medical colleges of Bangladesh; of which 5 were government and 6 were non-government. Study period was from January 2022 to December 2022. Data was collected by structured self-administered questionnaire, about the views of the stake holders (Dental teachers, interns and students of 3rd and 4th phases of BDS course). **Results:** With regard to advantages of CSC, 545 (80.4%) respondents agreed that CSC facilitate skill training before performing on real patient. More so, 544 (90.3%) respondents agreed that CSC increases scope of repeated practice, 360 (64.7%) respondents felt that CSC training helped in overcoming the resistance by the patients who were not interested to intervene them by the trainees and 531(88.5%) agreed that skill training in CSC will reduce medical error. Regarding limitations of CSC, 419 (69.6%) respondents opined that establishing and maintaining CSC are very costly. Total 548 (90.9%) respondents agreed that CSC requires formally trained trainer, 550 (91.6%) respondents felt that CSC needs formally trained supporting staffs, and 533 (89%) agreed that CSC requires well defined infrastructure. **Conclusion:** The study strongly suggests stakeholder's positive perspective towards learning clinical skills in CSC. Medical educators, policy makers and curriculum designers can use the results of this study to incorporate clinical skill center based learning in undergraduate curriculum and establish CSC to train and enhance students' clinical skills and maintain patients' safety.

Key words: Clinical skill center (CSC), Dental education, Clinical skills

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Introduction

Due to the rapid growth of medical technology, there have been notable changes in medical and dental education around the world. The use of this technology in contemporary medicine has challenged established ways of clinical skills training, learning, and teaching. The present changes in

the health care delivery system have resulted in a reduction in the standard of clinical skills among students. Encouragement of outpatient care and daycare, brief hospital stays, early diagnosis, the ethical consideration of practicing on actual patients, patient rights, and a significant growth in the number of students relative to the amount of teaching

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staff are among the key challenges. Patients who are clinically unstable or extremely unwell should not be taught at their bedsides or in chairs. These all serve to reinforce the need for the creation of clinical skill centers¹. The clinical skill center, often known as the CSC, is a cutting-edge facility that offers an opportunity for students and working clinicians to learn and acquire clinical skills in a prepared and controlled setting. A complex real-world process can be artificially simulated with sufficient authenticity to achieve a goal, such as in training or performance assessment².

In addition to the traditional bedside, clinical teaching approaches, skill- and simulation-based training in medical education is essential for developing competent and independent healthcare providers, which will subsequently improve patient care and safety. It provides a variety of advantages, such as exposure to unusual, adaptable situations, freedom to make mistakes without repercussions, and the opportunity to improve and gain more self-assurance. The simulation center is a crucial part of medical education since it offers the possibility of meticulous feedback and assessment³.

The abilities acquired through the clinical skill centers and their use in the treatment of actual patients have remained a topic of discussion and further investigation. However, numerous studies have shown that students who received training in skill and simulation laboratories were more professional and were able to complete procedures more quickly. They also had better communication skills and provided patients with better care overall. Previous research has found that procedural skills are improved during training at skill and simulation centers, which also results in a considerable decrease in medical errors⁴.

The BDS undergraduate dentistry program in Bangladesh primarily adheres to the traditional method of five years of training, with students typically beginning clinical

training on opportunity-based patient contacts right after taking a fundamental sciences course without any simulation-based training. To promote skill-based dental education, a Clinical Skill Center (CSC) must be established in undergraduate dental institutions.

Methodology

This was a descriptive type of cross sectional study. Both quantitative and qualitative approaches was applied in this study. This study period was of 12 months starting from 01 January 2022 to 31 December 2022. The study was conducted at different government and non-government dental colleges and dental units of medical colleges of Bangladesh. Out of these eleven were dental institutions, six were situated in the Dhaka city and five were situated outside Dhaka. Five of these institutions were government and the rest six were non-government. Undergraduate dental students of third and fourth phases of BDS course, intern doctors and dental clinical subject teachers of the selected dental colleges of Bangladesh were the study populations.

Sample size was 637, out of which 453 were students, 90 were intern doctors and 104 were teachers. Convenient sampling technique was adopted to enroll the participants.

A pretested self-administered semi structured questionnaire was used to collect data from 603 respondents of 3rd and 4th phase dental students, Intern doctors and dental teachers. An in-depth interview schedule was used to conduct an in-depth interview with the 34 dental teachers.

A written forwarding letter introducing the researcher and the purpose of the study to the concerned authorities of the selected dental colleges was obtained from Director, Center for Medical Education.

After collection of data, the questionnaires were coded and checked for inconsistencies and missing data. Data was then checked and

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edited and then processed and analyzed by using Statistical Package for Social Science (SPSS) computer software version 19. The data was then expressed as mean, standard deviation for numerical variables and as frequency and percentage for categorical variables. Collected data was presented with appropriate tables and graphs for easy understanding and interpretation with necessary statistical analysis and description given as per the objectives of the study. Qualitative part of the data was presented in the narrative form.

Ethical approval of the research protocol was taken from the Institutional Review Board (IRB) of Centre for Medical Education (CME), Dhaka.

Results

Results of this descriptive cross-sectional study has been organized according to the instrument used. The study was designed to have both quantitative and qualitative approaches (mixed method). Data collected from a total of 637 respondents consisted of teachers, interneers and students. Of them 603 responded through the self-administered semi- structured questionnaires. In-depth interviews were conducted with Professors, Associate professors, Assistant professors and teachers of different dental institutions and the total number of respondents were 34.

Quantitative data

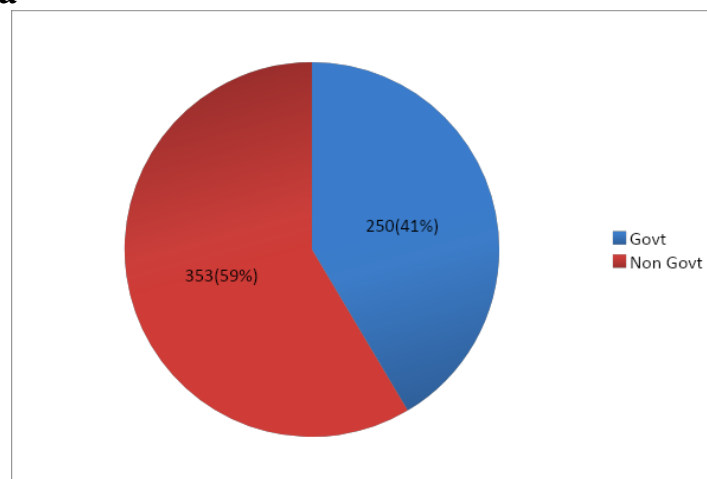


Figure 1: Distribution of respondents by category of their dental colleges (n=603)

Figure 1 shows that out of 603 respondents' 50 participants were from government dental colleges and 353 were from non-government dental colleges.

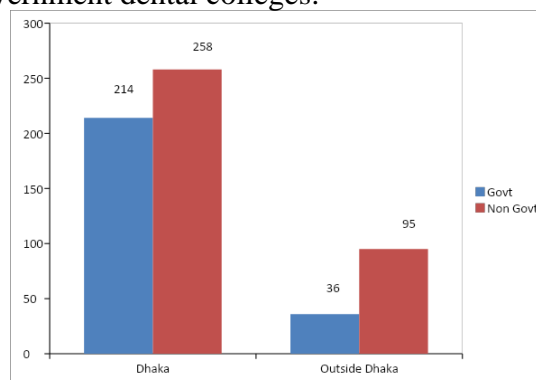


Figure 4: Distribution of respondents by their location and category of dental colleges (n=603)

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Figure 4 shows that out of 603 Respondents 214 government respondents from Dhaka city and 36 government respondent from outside Dhaka city. About 258 non-government respondents from Dhaka city and 95 non-government respondents from outside Dhaka city.

In this study, Table 1 showed the distribution of the respondents by their opinion regarding different situation related to real patients and devices. It was found that, out of 4-point scale the mean scores were within 1.64 to 2.69 (41% to 67%). Table 2 showed the distribution of the respondents by their opinion regarding different situation related to simulated patients and devices. It was found that, out of 4-point scale the mean scores were within 1.03 to 1.62 (21% to 32%). Table 3 showed the distribution of the respondents by their opinion regarding different issues related to advantages of Clinical Skill Centre (CSC) based training. It

was found that out of 5-point Likert scale the mean scores were within 2.58 to 4.38 (51% to 87%). Table 4 showed the distribution of the respondents by their opinion regarding different issues related to the limitations of Clinical Skill Centre (CSC) based training. It was found that out of 5-point Likert scale the mean scores were within 3.11 to 4.15 (62% to 83%). Table 5 shows the distribution of the respondents by their opinion regarding different Issues related for implementing the Clinical Skill Centre. (CSC). It was found that out of 5-point Likert scale the mean scores were within 4.21 to 4.43 (84% to 87%). Table 6 showed the distribution of the respondents by their opinion regarding different Issues related to the requirement of advanced devices for learning clinical skills in dental education as a part of CSC. It was found that out of 5-point Likert scale the mean scores were within 4.24 to 4.41(85% to 88%).

Table 1: Distribution of the respondents by their opinion regarding different situation related to real patients and devices

Situation related to real patients and devices	Frequency (%) of level of agreement					Mean (±SD)
	N=0	IA=1	OPT=2	SU=3	AB=4	
My organization uses real patients for training purpose (n=600)	37 (6.2)	131 (21.8)	190 (31.7)	137 (22.8)	105 (17.5)	2.24 (1.56)
Teacher has skills on clinical skill training using real patient (n=601)	13 (2.2)	45 (7.5)	203 (33.8)	194 (32.3)	146 (24.3)	2.69 (0.99)
Students get chance to practice on real patients (n=602)	65 (10.8)	135 (22.4)	203 (33.7)	120 (19.9)	79 (13.1)	2.02 (1.18)
My organization has real devices like cadaver, bones, specimen, slide etc. for training purpose (n=600)	50 (8.3)	112 (18.7)	236 (39.3)	135 (22.5)	67 (11.5)	2.10 (1.09)
Skills of teachers on clinical skill training using real device (n=599)	52 (8.7)	85 (14.2)	232 (38.7)	141 (23.5)	89 (14.9)	2.22 (1.23)
Scope of practicing skills by the students using real devices (n=598)	96 (16.1)	188 (31.4)	188 (31.4)	86 (14.4)	40 (6.7)	1.64 (1.11)

N: None (Not at all present), IA (In adequate): Present but there is scarcity to fulfill the requirement, OPT (Optimum): Can fulfill the

requirement, SU (Sufficient): Slightly more than the requirement & AB (Abundant): Much more than requirement

Table 2: Distribution of the respondents by their opinion regarding different situation related to simulated patients and devices

Situation related to simulated patients and devices	Frequency (%) of level of agreement					Mean (±SD)
	N=0	IA=1	OPT=2	SU=3	AB=4	
Presence of simulated patient (n=602)	205 (34.1)	150 (24.9)	185 (30.7)	40 (6.6)	22 (3.6)	1.21 (1.10)
Skills of teachers on clinical skill training using simulated patient (n=599)	147 (24.5)	115 (19.2)	201 (33.6)	89 (14.7)	47 (7.8)	1.62 (1.22)
Scope of practicing skills by the students using simulated patient (n=602)	209 (34.7)	172 (28.6)	149 (24.8)	53 (8.8)	19 (3.2)	1.17 (1.10)
Presence of simulated training devices (n=597)	232 (38.9)	132 (22.1)	152 (25.5)	50 (8.4)	31 (5.2)	1.19 (1.19)
Skills of teachers on clinical skill training using simulated device (n=598)	157 (26.3)	121 (20.2)	177 (29.6)	99 (16.6)	44 (7.4)	1.59 (1.24)
Scope of practicing skills by the students using simulated device (n=597)	257 (43.0)	158 (26.5)	118 (19.8)	37 (6.2)	27 (4.5)	1.03 (1.13)

N= None (Not at all present), IA (In adequate): Present but there is scarcity to fulfill the requirement, OPT (Optimum): Can fulfill the requirement, SU

(Sufficient): Slightly more than the requirement & AB (Abundant): Much more than requirement

Table 3: Distribution of the respondents by their opinion regarding different Issues related to advantages of Clinical Skill Centre (CSC) based training

Statement related to advantages of Clinical Skill Centre (CSC) based training	Frequency (%) of level of agreement					Mean (±SD)
	SDA=1	DA=2	NANDA=3	A=4	SA=5	
Facilitate skill training before performing on real patient	12 (2.0)	26 (4.3)	20 (3.3)	208 (34.5)	337 (55.9)	4.38 (.895)
Assessing competencies on the skill before performing on real patient	12 (2.0)	22 (3.7)	37 (6.2)	276 (45.9)	254 (42.3)	4.23 (.872)
Ensure that the trainees are competent of the skill at least on the simulation	13 (2.2)	28 (4.7)	58 (9.7)	292 (48.8)	207 (34.6)	4.09 (.905)
Reduce the requirements of real patients for training the trainees	58 (9.7)	198 (33.0)	128 (21.3)	156 (26.0)	57 (9.5)	2.91 (1.18)
Reduce the requirements of real devices for train the trainees	103 (17.2)	236 (39.4)	96 (16.0)	131 (21.7)	32 (5.3)	2.58 (1.16)
Increase scope of repeated practice on a skill by the trainees	3 (.5)	18 (3.0)	36 (6.0)	291 (48.3)	253 (42.0)	4.28 (.771)
Facilitate the trainees to train them at own pace (available time and training requirement)	6 (1.0)	29 (4.9)	58 (8.9)	294 (49.2)	214 (35.8)	4.14 (.861)
Overcoming the resistance by the patients who are not interested to intervene them by the trainees	10 (1.7)	33 (5.5)	166 (27.8)	296 (49.5)	91 (15.2)	3.70 (.875)

SDA= Strongly disagree (When you largely disagree with the statement), DA (Disagree): When you have some disagreement with the statement, NANDA (Neither agree nor disagree): When you cannot decide

to agree or disagree with the statement, A (Agree): When you have some agreement with the statement & SA (Strongly agree): When you are largely agreeing with the statement

Table 4: Distribution of the respondents by their opinion regarding different Issues related to limitations of Clinical Skill Centre (CSC) based training

Issues related to Clinical Skill Centre (CSC) based training	Frequency (%) of level of agreement					Mean(\pm SD)
	SDA=1	DA=2	NANDA=3	A=4	SA=5	
Trainees poorly develop empathy towards the patient in training in CSC as the simulation are not real	34 (5.7)	147 (24.6)	167 (27.9)	208 (34.8)	40 (6.7)	3.11 (1.05)
In CSC the simulated signs and symptoms learned by the trainees are nearly fixed and do not represent the real-life clinical problems that vary from patient to patient.	27 (4.5)	96 (16.0)	121 (20.1)	282 (46.9)	74 (12.3)	3.46 (1.05)
In CSC the simulated communication skills learned by the trainees are nearly fixed and these poorly represent linguistic and socio-cultural variations among patients in real clinical training.	14 (2.3)	69 (11.5)	153 (25.5)	288 (48.1)	70 (11.6)	3.53 (.977)
Establishing and maintaining CSC are very costly	10 (1.7)	68 (11.3)	105 (17.4)	306 (50.8)	113 (18.8)	3.74 (.947)
It requires formally trained trainers	1 (.2)	14 (2.3)	39 (6.5)	399 (66.2)	149 (24.7)	4.12 (.657)
It requires formally trained supporting staffs	1 (.2)	12 (2.0)	36 (6.0)	397 (66.1)	153 (25.5)	4.15 (.675)
CSC requires well defined infra-structure	5 (.8)	14 (2.3)	45 (7.5)	367 (61.3)	166 (27.7)	4.12 (.749)
Policy makers are not well informed	10 (1.7)	80 (13.4)	179 (29.5)	239 (40.0)	91 (15.2)	3.53 (.972)
Resistance to change in teaching method	28 (4.7)	115 (19.2)	155 (25.9)	213 (35.6)	87 (14.5)	3.36 (1.09)

Table 5: Distribution of the respondents by their opinion regarding different Issues related for implementing the Clinical Skill Centre (CSC)

For implementing Clinical Skill Centre (CSC), we need	Frequency (%) of level of agreement					Mean (\pm SD)
	SDA=1	DA=2	NANDA=3	A=4	SA=5	
Meticulous Planning	2 (.3)	5 (.8)	33 (5.5)	315 (52.7)	243 (40.6)	4.32 (.648)
Motivation of the policy makers	4 (.7)	7 (1.2)	22 (3.7)	353 (58.6)	216 (35.9)	4.28 (.652)
Allocation of necessary funds and resources	2 (.3)	2 (.3)	18 (3.0)	303 (50.5)	275 (45.8)	4.41 (.602)
Inclusion of CSC based training in the curriculum	1 (.2)	4 (.7)	35 (5.8)	331 (55.1)	230 (38.3)	4.31 (.624)
Prior visits to established CSC within and outside the country	5 (.8)	11 (1.8)	54 (9.0)	315 (52.6)	214 (35.7)	4.21 (.754)
Formal training of trainers(teachers) and supporting staffs	5 (.8)	1 (.2)	11 (1.8)	306 (50.7)	279 (46.3)	4.42 (.651)
Appointing experts and consultants for establishing CSC	2 (.3)	2 (.3)	16 (2.7)	300 (49.8)	283 (46.9)	4.43 (.598)

Table 6: Distribution of the respondents by their opinion regarding requirement of advanced devices for learning clinical skills in dental education as a part of CSC

Requirement of advanced devices for learning clinical skills in dental education as a part of CSC	Frequency (%) of level of agreement					
	SDA=1	DA=2	NAN DA=3	A=4	SA=5	Mean (±SD)
Skill-training manikins	3 (.5)	7 (1.2)	25 (4.2)	340 (56.6)	226 (37.6)	4.30 (.650)
High fidelity medical simulators	3 (.5)	5 (.8)	30 (5.0)	328 (54.7)	234 (39.0)	4.31 (.651)
Advanced surgical simulators	2 (.3)	7 (1.2)	14 (2.3)	297 (49.6)	279 (46.6)	4.41 (.632)
Phantom head laboratories	3 (.5)	5 (.8)	27 (4.5)	310 (51.7)	253 (42.2)	4.33 (.699)
Virtual reality work stations	8 (1.3)	14 (2.3)	40 (6.7)	295 (49.2)	241 (40.2)	4.24 (.807)
Computerized virtual reality simulators	9 (1.5)	9 (1.5)	36 (6.0)	302 (50.2)	245 (40.7)	4.27 (.786)
Virtual learning environment (VLE)	3 (.5)	14 (2.3)	25 (4.1)	291 (48.3)	270 (44.8)	4.34 (.713)

Findings from the in-depth interview

After matrix analysis of the answers of the respondents the findings are summarized as follows:

Most of them informed that real patients in the outpatient department are the main ways of learning clinical skills. Some respondents mentioned that they trained their student through multimedia, audio visual aids and models analysis. Some Head of departments mentioned that their student learn clinical skills by working on real patients under direct supervision. Some respondents mentioned that students of their institution use phantom head laboratories.

Almost all of them mentioned that they have sufficient patient in for learning clinical skills. Most of them mentioned that they don't have enough skill to train the students. Few of them informed me that they don't have enough skill as they have no means other than real patient to train the trainees.

Some of them mentioned that students get scope to practice skills directly on patients and opined that they should have scope to practice on model, dummies and simulation lab.

Almost all of them mentioned the necessity of establishing CSC in all dental institutes for all times to train both the students and interneer doctors for continuous professional development. All of the respondents opined that CSC based learning highly support the development of clinical skills.

Most of them strongly agreed that CSC based learning improve patient safety.

Maximum respondents agreed that if there is enough scope for practicing different procedure and at the same time assessment is done by trained faculties than the students will be more confidence in dealing with real patient. Some of them mentioned that as we don't have CSC we cannot be certain about this level.

Almost all of them agreed that CSC can create a realistic, safe and reproducible learning environment but stressed on proper uses and implementation of CSC.

Discussion

This cross sectional study was conducted to explore the views of teachers, interns and students regarding the role of clinical skill centers in undergraduate dental education.

The results of the study findings are discussed in two parts. The first part deals with the analysis of quantitative part i.e. the responses from the self-structured semi structured questionnaire and the second part analyzes the qualitative part of in-depth interview findings.

Quantitative Part

Out of 600 respondents 563 (93.8%) of them informed that their institutes uses real patient for training purpose. Only 131 (21.8%) of them mentioned that real patients were present for training purpose but there is scarcity to fulfill the requirement. In fact as dental treatment is expensive and Bangladesh is a thickly populated country so real patients are available for training purpose in most of the institutes. But in this regards respondents of government & non-government dental institute has statistically significant differences in their opinion means that in government dental institute's real patients are more available.

Regarding the availability of real device 438 (73.3%) of respondents agrees that they have optimum real devices and teachers has skills in train the students using that devices. But in case of scope of practicing with these devices 284 (47.5%) agreed that they did not have scope at all or there is insufficient scope to fulfill the requirements. Also there is statistically highly significant difference in opinion between the teacher & student, teacher & intern & between intern and students regarding the issues of presence of real device and scope of practicing skills by using this real device.

Situation related to the presence of simulated patient and devices, the agreement was not favorable by the respondents. Total 355(59%) respondents agree that they did not have or there is scarcity to fulfill the requirement of simulated patient, 364 (61%) mentioned the same opinion about the presence of simulated device. In fact, the presence of simulated

patient and device both are really very small in number in different dental institutes.

Considering the scope of practicing skills by the simulated device 257(43%) of the total respondents agreed that they did not have scope to practice with simulated device. There is statistically significant differences in opinion between teacher, interns & students and between government & non-government institutions. These findings of this study might be due to the availability of real patients for practicing clinical skills in most of the dental institutes of Bangladesh.

A large percentage of respondent 545(90.4%) agreed that CSC based training facilitates skill training before performing on real patients. In this regard also there is no significant differences of opinion between teachers, interns and students. Similar study found that most of the students (81.6%) strongly believed that simulation support can help to develop their clinical skills. This finding is quite similar to the findings of present study⁵.

In a CSC there is increase scope of repeated practice by the trainees. This statement is agreed by 544 (90.3%) of respondent and the mean score was 4.28. There is no statistically significant differences in opinion between the teacher, intern and student. Also there is no significant differences between the opinion of respondents of government and non-government dental institutions. Another study supported the advantages of scope of repeated practice by the trainees in SBL in CSC⁶.

In this study maximum respondents 531(88.5%) felt that SBL in CSC can minimize medical errors on the patients by the trainees and this is more or less with the same agreement as "simulation based medical education improves patient safety" by 86.6% of respondents of basic science and 82.6% of respondents from clinical science^{7,8}.

208 (34.8%) of the respondent agreed that trainees poorly develop empathy towards the patient in training in CSC as the simulation

are not real. Only 40 (6.7%) strongly agreed and 167(27.9%) of them were in neutral agreement. There is no statistically significant difference of opinion between teacher, intern and student but statistically significant difference exist between government and non-government institution. This study is similar to another study, where 52.6% of the respondents strongly agreed/agreed and 27.5% of the respondents were in neutral opinions that trainees poorly develop empathy in training in CSC⁸.

“SBL is relatively costly” this statement is supported by 57.9% of the respondents in a study, where 419(69.6%) respondents agree/strongly agree that establishing and maintaining CSC are very costly⁸.

There are studies stating that the lack of trainers experience in using simulation tools and methods, and the lack of validated and reliable curricula has been considered to be barriers to the use of simulation based learning in medical education^{9,10}. These statement is quite similar to findings of this study where 561(93.4%) respondents have agreed/strongly agreed in their opinion on inclusion of CSC based training in the curriculum and 585(97%) of the respondents in favor of formal training of the trainers and supporting staffs.

Integrating simulation into existing dental curriculum to enhance the teaching and learning is recommended by four studies^{11,12,13,14}. Another study found, 68.8% of the respondents felt that SBL in CSC should be integrated into the curriculum⁸. Respondents in a study who all were the medical teachers and 91.1% of them agree or strongly agree that simulation in CSC should be a part of medical curriculum and not stand alone activity⁷. The above studies are in line with present study that is supported by a range of 84% to 87% of respondents, though there are statistically significant difference of

opinion between teachers and interns and between teachers and students.

In this study 585(97%) of the respondents agreed that formal training of the trainers (teachers) and supporting staffs are very essential for smooth functioning of a CSC. This agreement is supported by two studies^{15,16} and suggested that full time faculty, instructors and supporting staffs, who are trained in simulation training and familiar with the simulators, are essential for management of CSC.

Around 548 (90.7%) of the respondents agreed/strongly agreed that CSC needs formally trained trainers and there is no statistically significant difference of opinion between teachers, intern and students. This findings is in line with another study⁷, As the study simulators in a CSC in modern days are equipped with latest technologies so there is no alternative to train the concerned faculties with that advancement.

This study found that 561(93.1%) respondents are in favor of virtual learning environment, 547(90.9%) are in favor of computerized virtual reality simulators and 536(89.4%) are in favor of virtual reality work stations. This findings are in line with a study and found that the ability to reset the simulator and carry out the same procedure repeatedly, with continuous feedback was seen as a major advantage⁶. This findings are also supported by another study, which stated that “although expensive to buy, virtual reality simulators require no additional equipment, whereas students using traditional phantom head simulators use thousands of plastic teeth per year in their training, so the virtual reality units may actually work out to be more cost-effective in the long run”¹⁰.

Qualitative findings

In-depth interview was conducted among 34 faculty members of different dental institutions. Out of 34 faculty members 4 of

them were Professor, 3 Associate professor, 19 Assistant professor and 8 lecturers. In-depth interview was taken from 6 dental institutions. Of them, three were from non-government dental colleges and three were from government dental institutions.

Answering the question ‘What are the ways/opportunities of learning clinical skills of students in your institution?’ nearly all the respondent informed that they are using real patients for learning clinical skills for students, though they are conversant about the use of simulation based learning worldwide.

The reason behind is that simulation based learning is yet to develop in dental institutions in Bangladesh. Some of them established traditional phantom head lab in a very limited scale but could not make them functional due to non-availability of consumable materials needed for running the phantom lab.

To answer the question ‘Do the students get necessary scope of practicing clinical skills?’ some of them mentioned that they did not get necessary scope due to non-availability of instruments and lab facilities. During my data collection from different institutes, I was informed that the newly established dental units are facing severe problem in this regard.

Answer to a question regarding the necessity of Clinical Skill Center, all of the (100%) respondents opined that Clinical Skill Centers should be established as it has the advantage of being effectively used in the undergraduate and postgraduate dental education, continuing medical education and continuing professional development in addition to other health specialties education.

Respondents was asked ‘whether CSC based learning support the development of clinical skills?’ Majority of them mentioned that CSC based learning supplementing and enhancing the clinical education of students. This

findings are supported by a study, where 88.8% of the respondents agreed /strongly agreed that simulation based teaching can improve learning outcome.

To answer the question ‘Do you feel that CSC based learning might improve patient safety?’ the overall impression was very positive. The explanation was that if students can be master in some essential procedures by practicing repeatedly in CSC, then they can work confidently and patient will be safe. This findings are quite similar to other two studies^{7,8}

In one of my question, ‘Do you feel CSC can create a realistic, safe and reproducible learning environment’ most participant give positive response. Study conducted by Joseph, stated that, although most participant believed that SBL can create a highly realistic, safe and reproducible learning environment, majority were not in favor of replacing real patients in clinical examination with simulators⁸. These findings are in line with the findings of the present study.

Answer to a question regarding challenges that needs to be addressed for implementing CSC in your institution, majority of the respondents agreed that adequate funding, necessary infrastructure, lack of proper knowledge about CSC and training of the faculties and staffs are the main barriers of implementing CSC.

Once the respondents are requested to mention their suggestions to overcome the challenges they also believed that build up awareness about necessity and importance of CSC, prioritize this SBL in CSC by the government authority, provision of financial support and trained manpower for smooth functioning of CSC and integrating the SBL into the existing dental curriculum to enhance the teaching and learning effect.

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Conclusion

With all of its inherent limitations, this cross-sectional study made an effort to investigate stakeholder's opinions on the use of clinical skill centers in undergraduate dental education in Bangladesh. Even if there are sufficient real patients to train students in clinical skills, all of the professors emphasized the necessity of creating a CSC to support and maintain clinical teaching in undergraduate dentistry education. The SBL facilities develop the learner's competence

and confidence via repeated practice in a stress-free atmosphere, which will improve patient safety, lower medical errors, and uphold patients' rights at the same time.

The usage of SBL is probably growing as new technology and methodologies are developed and medicine is modernized. Policy development is needed to ensure its coordinated and cost-effective implementation.

References

1. Archana, S., Nilakantam, S.R., Hathur, B. and Dayananda, M. The need and art of establishing skill and simulation centers to strengthen skill-based medical education: Learning insights and experience. *Annals of African Medicine*. 2021; 20(4), p.247.
2. Datta, R., Upadhyay, K.K. and Jaideep, C.N. Simulation and its role in medical education. *Medical Journal Armed Forces India*. 2012; 68(2), pp.167-172.
3. Al-Elq, A.H. Medicine and clinical skills laboratories. *Journal of family & community medicine*. 2007; 14(2), p.59.
4. Herrmann-Werner, A., Nikendei, C., Keifenheim, K., Bosse, H.M., Lund, F., Wagner, R., Celebi, N., Zipfel, S. and Weyrich, P. "Best practice" skills lab training vs. a "see one, do one" approach in undergraduate medical education: an RCT on students' long-term ability to perform procedural clinical skills. *PloS one*. 2013; 8(9), p.e76354.
5. Nisar S, Rehman D and Rehman A. Simulation based clinical skill training; A need of time. *Research square*. 2022; DOI: <https://doi.org/10.21203/rs3.rs-1355792/v1>
6. Al-Saud, L.M., Mushtaq, F., Allsop, M.J., Culmer, P.C., Mirghani, I., Yates, E., Keeling, A., Mon-Williams, M.A. and Manogue, M. Feedback and motor skill acquisition using a haptic dental simulator. *European Journal of Dental Education*. 2017; 21(4), pp.240-247.
7. Ahmed S, Al-Mously N, Al-Senani F, Zafar M, Ahmed M. Medical teachers' perception towards simulation-based medical education: A multicenter study in Saudi Arabia. *Med Teach*. 2016; 38 Suppl 1:S37-44. doi: 10.3109/0142159X.2016.1142513. PMID: 26984032.
8. Joseph N, Nelliyanil M, Jindal S, Utkarsha, Abraham AE, Alok Y, Srivastava N, Lankeshwar S. Perception of simulation-based learning among medical students in south India. *Annals of Medical and Health Sciences Research*. 2015; 5(4):pp247-252.
9. Ziv, A., Small, S.D. & Wolpe, P.R. Patients safety and simulation-based medical education, *Medical Teacher*. 2000; 22, pp. 489-495.
10. Cox MJ, Quinn BFA, Shahriari-Rad A, San Diego J, Smith T, Barrow A & Woolford, MJ. Factors Influencing the Uptake and Integration of Computer Simulations in Dental Education. In 40th Annual Meeting Association of Dental Education of Europe: Emerging New Approaches to Dental Education, At Riga, Latvia. 2014.
11. Welk A, Maggio M, Simon J, Scarbecz m. et al. Computer-assisted Learning and Simulation Lab with 40 DentSim Units', *International journal of computerized Dentistry*. 2008; 11, pp.17-40.
12. Amer, R.S., Denehy, G.E., Cobb, D.S., Dawson, D.V., Cunningham-Ford, M.A. and Bergeron, C. Development and evaluation of an interactive dental video game to teach dentin bonding. *Journal of dental education*. 2011; 75(6), pp.823-831.
13. Arigbede, A., Denloye, O. and Dosumu, O. Use of simulators in operative dental education: experience in southern Nigeria. *Bangladesh Journal of Medical Education* 2022; 14(2); Hyder et al., publisher and licensee Association for Medical Education. This is an Open Access article which permits unrestricted non-commercial use, provided the original work is properly cited.

- African health sciences. 2015; 15(1), pp.269-277.
14. Walker J and von Bergmann H. 'Lessons from a Pilot Project in Cognitive Task Analysis: The potential role of intermediates in preclinical teaching in Dental Education', *Journal of Dental Education*. 2015; 79(3), pp.286-294.
15. Okuda Y, Bryson EO, DeMaria S Jr, Jacobson L, Quinones J, Shen B, Levine AI. The utility of simulation in medical education: what is the evidence? *Mt Sinai J Med*. 2009; 76: pp.330-343.
16. Reader T, Flin R, Lauche K, Cuthbertson BH. Non-technical skills in the intensive care unit. *Br J Anaesth*. 2006; 96: pp.551-559.
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