Current Status of the Clinical Simulation Laboratory
at Kyorin University Faculty of Medicine
and Affiliated Hospital

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Abstract
1) Our Clinical Simulation Laboratory (CSL) registered 19,085 training attendances with nurses accounting for the
majority of trainees in first three years. Basic Life Support training experienced the highest demand.
2) CSL usage rose markedly in both spring and fall, showing three daily peaks (9 am, 10 am and 5 pm), and lasted for
an average of one and a half hours per session.
3) The lending rate of the simulators to areas outside CSL came to about half of the internal use rate. The current
simulator-based training program requires improvement to increase attendance by medical students and doctors.

Key words: clinical simulation laboratory, skills laboratory, faculty of medicine, university hospital

Introduction

Since the formal adoption of a new system for clinical resident training in the 2004/5 academic
year, followed by the introduction of nationwide OSCE at medical schools in the 2005/6 academic
year, practical skills training have received considerable importance. Medical safety
management has also begun to pay special attention to simulation training.

In view of this background, the need for training facilities referred to as clinical simulation

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laboratories (CSL) or skills laboratories has increased in recent years in Japan, and they are
being implemented throughout the country, with a focus on university hospitals and training hos-
pitals.

However, there are instances where CSL is not being effectively utilized, with students
taking advantage of this facility only during the few weeks preceding OSCE but otherwise
frequently regarding it as a mere repository of simulators and training aids. Addressing this
issue with a view toward more effective operation of the facility, we believe the position of
a full-time superintendent and a range of appropriate instructional programs are required.

Kyorin University opened CSL in 2007, and as the facility is now well into its fourth year of
running the time seemed right to conduct a survey of its operation.

The purpose of our survey was to assess the
usage of CSL over the preceding three years and to consider issues such as its maintenance and future direction.

**Method**

Before addressing the method of our survey, let us introduce the current operation of CSL.

*<CSL operation>*

Kyorin University, Faculty of Medicine and Affiliated Hospital are located on the same campus. CSL occupies a gross floor area of approximately 217m² in one section of the hospital wards which makes available simulators and equipment listed below.

*<Principal Simulator–Based Training>*

Most basic Simulators were put in place, with the particular emphasis on those related to emergency resuscitation.

The following types of simulator–based training have been acquired.

1. Basic Life Support (BLS) for around 30 attendees at a time.
2. Airway management including bagmask ventilation and tracheal intubation.
4. Central venous catheterization (CVC) for in-hospital certification.
5. Syringe and infusion pump operation.
6. Surgical sutures using the surgical suture kit.
7. Auscultation of normal and abnormal respiratory sound.
8. Physical examination of cardiac patients.
9. Lumbar puncture.
10. Urethral catheterization.
11. Rectal examination.
12. Examination of the optical fundus and the eardrum.
13. Laparoscopic procedures including in-hospital certification in endoscopic surgery.

15. Emergency medical treatment such as for Advanced Life Support (ALS) and Advanced Trauma Life Support using the high performance simulator.


*<CSL Staff, Opening Hours & Trainees>*

Personnel at the Staff Education Room are in charge of CSL management. Two doctors from medical departments, one nurse and three office staff attend to CSL administration as well as other duties. Doctors handle general management tasks, the nurse carries out support trainings and makes arrangements for instructors. Office staff look after reservations and manages CSL equipment.

CSL opening hours are Monday to Friday from 9:00 a.m. to around 7:30 p.m. and Saturday from 9:00 in the morning to 12:00 noon, with Sundays and public holidays closed as a rule. Depending on the need for extra training program and activities, other times outside regular hours are arranged through consultation.

The majority of CSL users are from Kyorin University Affiliated Hospital, the Faculty of Medicine, the Faculty of Health Science, and the Nursing School. The use or lending–out of simulators requires prior reservation with CSL.

Within the context described above, and based on our CSL utilization records, we examined the first three years of the facility’s operation in terms of attendance, stakeholders receiving training, types of trainings, duration of trainings and simulator lending rates.

**Results**

1. **Annual attendance**

CSL registered 19,085 attendances over the three academic–years surveyed, from April 2007 to March 2010. Of these attendances, 4,082 occurred in 2007/8, followed by 8,159 in 2008/9, and 6,844 in 2009/10, i.e., an average of 6,362 attendances per academic year. Attendances in
2. Monthly and annual attendance

Figure 1 (top) shows the number of monthly and annual CSL attendances in each academic year. April, June, September and October are heavily attended but training falls off at yearend. Viewing the winter period more closely, a small peak can also be observed in February when fourth year medical students undertake the OSCE.

3. Classification of utilization by stakeholder

Figure 1 (middle) shows CSL utilization rates by stakeholder. Staff from the Department of Nursing and from Hospital wards account for 74% of total utilization; thus nearly three quarters of total attendants are nurses. Next, doctors (clinical departments and residents) occupy 9% of CSL use, Hospital Staff Education Room 6%, outpatient and other departments 4%. Nursing School 2 %, out of hospital 1%, medical students 2%, out of the hospital 1% and training supported by Medical Safety Management Office and by the Faculty of Health Sciences each comes to 1%.

4. Classification of utilization by type of training

Figure 2 (bottom) shows CSL utilization rates by training activity. Simulator of BLS was used most often at 68%, followed by blood sampling/IV at 12%, infection control 5%, ALS (ICLS) 2%, surgical suture training 2%, airway management and CVC each1%, and heart and lung sound auscultation 2%. Other types of training accounted for the remaining 7%. Of these, departmental “clinical conferences” and study sessions using CSL and its equipment occupied 20%, ECG training 18.5%, elderly care simulation 12%, support training for reinstated nurses 8.2%, disaster triage 7.1%, laparoscopic surgery 7%, syringe infusion pump 6.6%, initial trauma treatment 6%, fundus examination 4%, off-campus contracted training 4.6%, urethral

**Figure 1**
*ALS: Advanced Life Support, ICLS: Immediate Cardiac Life Support
**BLS: Basic Life Support
***CVC: Central Venous Catheterization

second year were 100% above those of first year and in third year stabilized at 60% over attendances in first year.
catheterization 2%, ear examination 1.4%. Pediatric ALS (PALS) 1.1%, and tracheal aspiration, anaphylactic shock training and medical student tutorials each came to 0.5%.

5. Peak hours and duration of CSL training sessions

While CSL opening hours are generally from 9:00 in the morning to 7:30 in the evening. Figure 2 (top) shows that CSL training, peaked three times a day, at 9:00 a.m., 10:00 a.m. and 5:00 p.m. By far the greatest number of attendances occurred at 5:00 in the afternoon. In terms of duration of training sessions within CSL, Figure 2 (bottom) shows that the majority of attendances (87%) lasted between 0.5 and 3.0 hours, the average duration being 2.4 hours, but with the 1.5–hour pattern of use being the most frequent.

6. Simulator lending rates

We also examined the extent to which simulators were used within CSL or lent out to other on-campus and off-campus areas. Internal use averaged 52% over three-year period, while lending accounted for 48%. On a year–by–year basis, lending stood at 30% in 2007/8, rose to 49% in 2008/9, and continued upward to 57% in 2009/10.

Discussion

While clinical simulation laboratory or skills laboratory facility, was reported to have originally been established at Maastricht University in Holland in 1974\(^1\), another view holds that Professor Michael S. Gordon of the University of Miami School of Medicine, building on his development of the cardiology patient simulator “Harvey”, was the first to set up a skills laboratory in 1966\(^2\).

Although the development of medical simula-

tors began in the 1960s with the BLS simulator “Resusci Anne,” and the aforementioned “Harvey”\(^2\), the establishment of simulation centers spread out only gradually from mainly Western and English–speaking countries from the late 1980s. However, even by 1994, there were still only 9 such places set up around the world\(^3\). While the worldwide number of simulation centers was in fact still small, the Clinton Administration initiated such centers on a national level from the viewpoint of medical care safety. Thus, both in the West and in Asia, Oceania and elsewhere 666 such centers had been established by 2006 (436 in America, and 104 in Europe)\(^3\).

In Japan, with the start of the clinical resident training system in 2004/5 and the launch of nationwide OSCE at medical schools in 2005/6, simulation centers spread among medical schools at universities, medical colleges and clinical training hospitals. According to Suzuki et al\(^4\), 59
out of 73 universities had already established simulation centers at their medical schools by 2008, and another 12 were in the planning stage. In Japan as well as many other countries the installation of simulation laboratories has shown a marked increase from about 2000.

The reasons that led to the establishment of CSL at Kyorin University Faculty of Medicine and Affiliated Hospital were threefold. First, it had become imperative to reinforce hospital staff training in medical safety management. Second, there was the need to conduct clinical skills training before OSCE at the Faculty of Medicine. Third, the need arose to carry out participatory clinical training in a safe and effective environment.

Kyorin University followed up with its own CSL in 2007, handling an average of 6,362 trainee attendances per year. BLS, targeting nursing staff, showed the highest rate of utilization of all CSL facilities. This is the result of our approach to training in the Department of Nursing. As part of our activities we coach instructors with a focus on the emergency department and on the intensive care unit, and extend the scope of training into the wards. Another reason for ward nurses and Department of Nursing staff being the most frequent users of CSL stems from the fact that they extensively take out certification in blood sampling/IV training and in BLS.

Resuscitation-related training appears to be the most frequent type of simulation training in Japan \(^5\), a tendency that can be widely observed.

Over the period of analysis, we noted a tendency for monthly training hours to peak in April and June, and again in September and October, with end of year and winter training falling off. We suppose it is because medical care training itself is usually heavy in spring and fall, due to the structure of the academic year. As for daily utilization, training attendances at 9:00 a.m., 10:00 a.m. and 5:00 p.m. are found to be most frequent because it is convenient to schedule training programs after day or night shifts. Training sessions for the most part took 1.5 hours.

Though the average lending-out rate for CSL facilities over the three years came to 48%, the number of training attendances doubled in the second year, and in the third year settled at a rate 57% above the first year rate. With the lending-out rate having increased from 30% to nearly 60% during that period of time, the difficulty of making training reservations reflects the demand for using CSL simulators.

During times of intensive CSL utilization, internal space is fully occupied due to the large number of reservations, and this has the effect of an increased lending-out rate of simulators.

Taking care of simulators is the important work of CSL staff. In particular, we need to be aware that BLS simulators, which are required in 68% of our training classes, are really “consumables”. We know from experience that the face and chest areas of BLS simulators get soiled or damaged by frequent utilization, and need to be maintained periodically once a month. After OSCE and other occasions where many subjects use BLS simulators at the same time, it is appropriate to replace the lungs from the viewpoint of hygiene.

Given the growth in CSL utilization, cooperation with the departments sections and especially The Department of Nursing is important, and it is also appropriate to aim for the establishment of a variety of in-hospital training courses. The currently regularly held training sessions are BLS for medical support
staff, BLS in-hospital certification for nurses and medical Doctors, surgical suture training for residents, IV in-hospital certification for nurses, endoscopic surgery certification and CVC in-hospital certification training courses. Apart from these 6 courses, ALS (ICLS) is held, led by the Emergency Department. Students from the Faculty of Hearth Science and the Nursing School can also use our current facilities, but utilization by these quarters is still only slight. The fact is that medical students adopt a narrow focus in terms of actual practice and OSCE prior to their period of training in clinical diagnosis.

Except for training for OSCE, simulator training is still not actively included in the curriculum of the Faculty of Medicine. On the other hand, little by little, any simulators are beginning to be used in Bed Side Learning (BSL). As the simulators which medical doctors want to use (e.g. Intervention and Endoscopy) are very costly, acquisition is insufficient at present. This may be one reason accounting for low utilization by doctors.

The Faculty of Health Sciences and the Nursing School have their own simulator-equipped laboratories and borrow our resources only when their supply is inadequate. In order to increase CSL utilization by medical students as of now, we will require a new curriculum with a training plan based on simulator use.

From here on, we will need to involve ourselves in the curriculum of the Faculty of Medicine and make plans how to use official subsidies for the purchase of expensive specialized simulators. Beyond that, generally, we would consider more active cooperation and exchange of information between facilities to be of great mutual benefit.

Conclusion

In this paper, we reported the status of the CSL of Kyorin University Faculty of Medicine and Affiliated Hospital. The principal users over the three years of investigation were shown to be nurses, with BLS being the foremost training objective. Annual utilization is highest in spring and fall. Daily usage showed two peaks in the morning and one in the late afternoon. Training sessions of one and a half hours were the most typical. While the average utilization rate of simulators internal to CSL compared nearly even with the lending-out rate, the latter has been climbing dramatically.

Our survey has shown that CSL operation at Kyorin University can be improved in several areas such as in administration, maintenance and curriculum formulation. The effectiveness of the facility can be raised by establishing a supervisory position setting appropriate policies and in-hospital training programs to attract a higher percentage of medical students to simulator training. In order to develop a productive curriculum we also need to establish stronger cooperation between the Department of Nursing and the other areas of the institution and plan for the allocation of official subsidies.

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