

## —Articles—

## Implementation of Integrated Medical Curriculum in Japanese Medical Schools

Toshiro Shimura<sup>1</sup>, Takumi Aramaki<sup>1</sup>, Kazuo Shimizu<sup>1,2</sup>, Tsuguhiro Miyashita<sup>1,3</sup>  
Koji Adachi<sup>4</sup> and Akira Teramoto<sup>4</sup>

<sup>1</sup>Academic Quality and Development Office, Nippon Medical School

<sup>2</sup>Second Department of Surgery, Nippon Medical School

<sup>3</sup> Department of Radiology, Nippon Medical School

<sup>4</sup>Department of Neurosurgery, Nippon Medical School

### Abstract

Recently, various integrated medical curricula, which can be defined as courses with subject matter classified by organ systems rather than according to departments such as surgery and internal medicine, are beginning to be introduced to bedside-learning in Japan. For example, in such an integrated medical curriculum, lectures in the course on neurological diseases would be given by a team that would include neurosurgeons, neurologists, and pathologists. Using medical education on neurological diseases as an example of an integrated medical curriculum, we analyzed the factors related to the neurological disease course as an example of an integrated medical curriculum in the clinical medicine course at our school. We also compared our course with those of all private medical schools in Japan, using the syllabuses of these private medical schools for the comparison, and considered elements that measured interdisciplinary participation in presenting the curriculum. For an integrated medical curriculum to gain interdisciplinary acceptance, the curriculum should be constituted using all medical disciplines related to the specific organ involved in the disease process under study, including both basic medicine and clinical medicine. In addition, teachers should be informed of the rationale for such a curriculum to promote their participation and a textbook on the integrated medical curriculum is needed. A curriculum committee should play an important role in promoting this type of medical education.

(J Nippon Med Sch 2004; 71: 11–16)

**Key words:** medical education, integrated, curriculum, structure and function

### Introduction

The training of medical students is an important role for clinicians in university hospitals. A program using an integrated medical curriculum, which con-

sists of courses grouped according to an organ system rather than according to a department within a medical school such as surgery or internal medicine, can provide a comprehensive and systematic understanding of a disease or a group of diseases. As one example, in such an integrated medical curriculum,

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Correspondence to Toshiro Shimura, MD, Academic Quality and Development Office, Nippon Medical School, 1-1-5 Sendagi, Bunkyo-ku, Tokyo 113-8603, Japan

E-mail: t-simura@nms.ac.jp

Journal Website (<http://www.nms.ac.jp/jnms/>)

the course on neurological diseases would be given by a team of neurosurgeons, neurologists, and pathologists. This interdisciplinary team approach would also apply to diseases of the endocrine and metabolic systems, among others. For many medical students this can be an effective learning system that promotes a problem-solving approach.

In recent years, such curricula have been employed by faculties of many medical schools in Japan<sup>12</sup>. However, at present, these programs have not been fully developed to encompass teaching by those involved in all specialties and subspecialties involved in the treatment or diagnosis of specific diseases related to a specific organ system, nor by those who study the structure and function of that organ system. The latter would be those involved in fields of medicine that do not involve direct patient contact, referred to hereinafter as "basic medicine." In 2001, guidelines for teaching diseases focusing on both pathophysiology and symptoms were introduced into medical education in Japan with distribution of a model core curriculum<sup>12</sup>. It has been recognized that with the conventional medical education system, lectures on pathophysiology, as well as on other areas of basic medicine, are often neglected. Therefore, an integrated curriculum should be implemented to avoid such gaps in medical education.

However, even after the introduction of the model core curriculum, such integrated curricula including interdisciplinary cooperation among departments have not been initiated in all Japanese medical schools. An integrated curriculum that is conducted by only clinical departments will result in deficiencies in medical education, particularly in pathophysiology. Therefore, I compared an integrated curriculum offered at our medical school, which incorporates a wide range of perspectives through input from various departments within clinical and basic medicine but with a focus on a specific organ system, with integrated medical curricula offered by private medical schools in Japan and a national medical school. For this analysis, we selected the neurological diseases course.

The purpose of this study was to assess our integrated curriculum, compare our syllabus with those of other private medical schools, and evaluate the

position of our school in comparison with other Japanese private medical schools as well as a public medical school. This information may be used to increase participation by departments of basic medicine in such a curriculum. In addition, we discuss various problems about such a multidisciplinary approach in the integrated medical curriculum.

## Materials and Methods

First, we determined the number of lectures and number of courses in clinical and basic medicine at our school for the purpose of revealing the extent of participation by those involved in basic medicine (**Table 1**). We then more closely examined the neurological diseases course as an example to reveal the degree of interdisciplinary participation or, to use another term, "unification." In the neurological diseases course, we compared the relevant departments in our school with those at all private medical schools with regard to the year the students were in, the percentage of students in clinical and basic medicine, the subjects covered and the total number of subjects. Information on the number of lectures was obtained through syllabuses provided by the private medical schools. In addition, we examined information given on the current state of the medical education curriculum in 2001 to develop figures and tables to illustrate the status of the integrated medical curriculum in Japan.<sup>3</sup>

We also conducted a questionnaire in December 2002, to assess the opinion of teachers in our medical school about the integrated medical curriculum.

## Results

In Japan, 29% of faculties of medicine in universities have adopted many parts of the integrated medical curriculum and 33% have adopted some part of it (**Fig. 1**)<sup>3</sup>. We reviewed the profiles of 23 courses at our school and found that many lectures given during bedside learning time excluded diagnostic and laboratory courses (**Table 1**). The number of lectures in these courses ranged from 10 to 74 (average: 36.70). The average number of subjects related to clinical medicine in each course was 4.26

Table 1 Breakdown of the integrated medical curriculum in the clinical medicine system

Courses	No. lectures	No.	
		Clinical Medicine	Basic Medicine (Pathology)
Intoduction to Clinical Medicine	30	9	1
Cardiovasucular Diseases	72	8	1 (1)
Respiratory Diseases	72	4	2 (1)
Digestive Diseases	72	6	1 (1)
Neurological Diseases	74	6	1 (1)
Endocrine, Metabolic and Nutritional Diseases	32	6	1
Renal and Genito-urinary Diseases	56	3	1 (1)
Hematologic Diseases	18	2	1 (1)
Allergic, Rheumatic and Others Immunologic Diseases	28	6	1
Infectious Diseases	24	8	2
Reproductive and Women's Medicine	24	4	2 (1)
Perinatal Medicine, Growth and Development	24	2	
Emergency and Critical Care Medicine	32	4	
Rehabilitation and Physical Medicine	10	1	
Musculoskeletal & Sensation System	26	1	
Skin Diseases, Plastic and Reconstructive Surgery	34	2	
Sensory Organ Diseases	48	2	
Psychiatry	32	2	
Radiological Interpretation & IVR	24	1	
Social Medicine	44		2
Clinical Pharmacology and Toxicology	32	12	4, *
Clinical Oncology	18	8	4 (1)
Clinical Genetics	18	1	2

IVR: Interventional Radiology

\*: Section of pharmacology

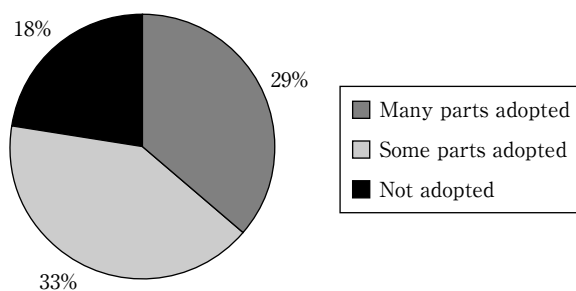


Fig. 1 Present utilization of the integrated medical curriculum by faculties of medicine in universities in Japan. In Japan, 29% of faculties of medicine have adopted many parts, 33% have adopted some parts, and 18% have not adopted any parts of an integrated medical curriculum.

and that for basic medicine was 1.13. Under the category of basic medicine, the number of lectures on pathology is shown in parentheses (**Table 1**). Pathol-

ogy comprised one third of the basic medicine lectures. The three courses for which lectures are given by a single department and cannot be part of an integrated curriculum were rehabilitation and physical medicine, musculoskeletal and sensorial systems, and radiological interpretation and interventional radiology<sup>4</sup>.

**Table 2** shows the number of lectures and courses, the amount of bedside learning and the number of bedside courses in an integrated medical curriculum for clinical medicine among Japanese medical schools<sup>3</sup>. Comparison was made among our medical school, public medical schools and private medical schools. The integrated medical curriculum in clinical medicine was being used in 20 out of the 29 private medical schools. The average number of courses in the private medical schools was 18.32 in comparison with the 23 courses offered in our

Table 2 Participation in the integrated medical curriculum in clinical medicine systems

	Number of lectures	Number of courses	Bedside training time (hours)	Number of Bedside training courses	Total Time (hours)
Private Schools	791.50 n = 20	18.32 n = 19	171.36 n = 7	6.43 n = 7	856.92 n = 19
NMS	789.8	24	0	0	789.8
Public Schools	651.36 n = 20	13.70 n = 20	340.67 n = 9	7.63 n = 8	830.85 n = 18
Average	721.43 n = 40	15.95 n = 39	266.59 n = 16	7.07 n = 15	844.24 n = 37

NMS: Nippon Medical School

school. Seven private medical schools used the integrated medical curriculum for bedside learning, with the average number of courses being 6.43.

The neurological diseases course in the integrated medical curriculum of clinical medicine was used in our school for the third term in year 3 and all of year 4, compared with 52% in year 4, 41% in year 3, and 7% in year 6 in the private medical schools. With a breakdown according to the field, either clinical or basic medicine, at our school the percentage of classes that used the integrated medical curriculum in the clinical medicine system was 86% and in the basic medical system 14%, but for the private medical schools, these percentages were 91% for clinical medicine and 9% for basic medicine. In our school, a total of 6 subjects in clinical medicine were provided, with a breakdown of two in internal medicine and one each in neurosurgery, pediatrics, otolaryngology, and rehabilitation in the course on neurological diseases. On the other hand, in all private medical schools, disciplines in both clinical and basic medicine that used the integrated curriculum for the neurological diseases course were more diversified than in our school, totaling 14 departments, with the breakdown as follows: internal medicine, neurosurgery, neurology, pediatrics, radiology, otolaryngology, rehabilitation, emergency and critical care medicine, orthopedic surgery, ophthalmology, pain clinic, plastic surgery, urology, and oral surgery. As to the breakdown of subjects in basic medicine in the course on neurological diseases, the subjects at all of the private schools offered within this course were pathology, anatomy, pharmacology, physiology, and

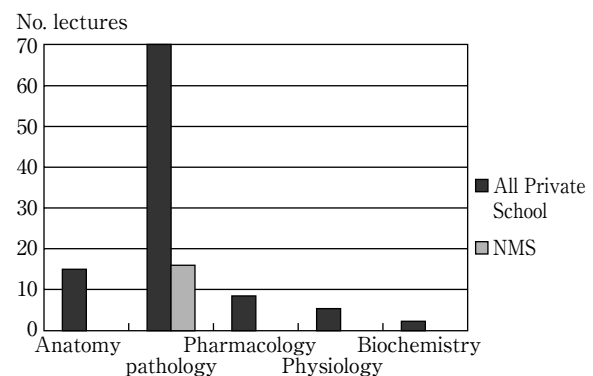


Fig. 2 Breakdown of basic medicine in the neurological diseases course of an integrated medical curriculum in the clinical medicine system.

biochemistry, but in our school, the only basic medicine subject in the neurological diseases course was pathology (Fig. 2). As to the number of subjects in the neurological diseases course, our school used 6 subjects, while among the private medical schools, one school used 3 subjects, while 4 and 9 subjects were offered in three schools, respectively, and 2, 5, 6 and 8 subjects were offered by 2 schools, respectively, and 7 subjects were offered by one school.

With regard to the questionnaire given to teachers in our medical school to assess their opinion on the integrated medical curriculum, 58% responded. Of those who returned the questionnaire, 62% stated that the degree of unification (defined as interdisciplinary participation) of the curriculum of these lecture courses was insufficient (Fig. 3). Furthermore, 66% of the teachers felt that greater unification with regard to basic medicine was needed (Fig. 4).

[Question]  
Do you think that the degree of unification in this course is sufficient?

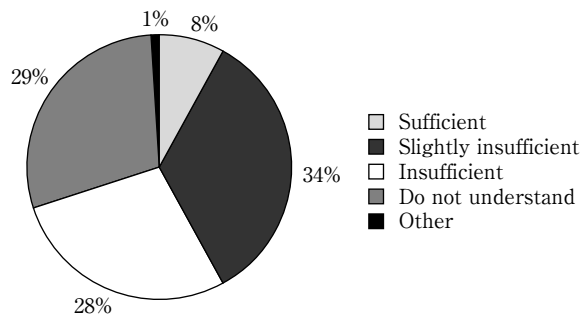


Fig. 3 A teacher questionnaire

[Question]  
Is greater unification necessary in the basic medicine course lecture?

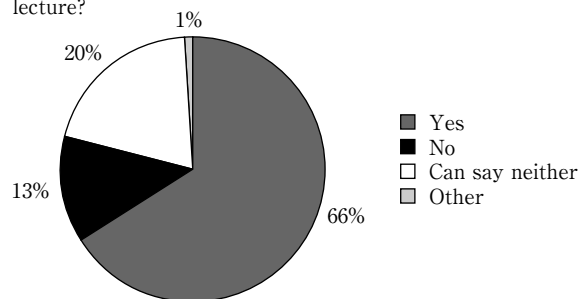


Fig. 4 A teacher questionnaire

## Discussion

For clinicians working in Nippon Medical School, student education is of prime importance. For several years, we have used an integrated medical curriculum that employs a wide range of perspectives from several disciplines related to a specific organ system as a part of a new curriculum. The rationale for such a curriculum is that physiological alterations of the entire body, which include the pathophysiology of the disease state, diagnosis, and treatment, require, transverse departments of both basic and clinical medicine, enabling systematic learning through input from those in various departments<sup>5</sup>. However, the utility of such a system has not yet been defined.

Notable are the following points. The present integrated medical curriculum can provide effective learning so that many students should be able to acquire sufficient problem-solving skills pertaining to a

disease. On the other hand, the major drawback is that the scientific systematic study of each specific subject is lost. When incorporating a wide range of perspectives and disciplines in the integrated medical curriculum, it is occasionally impossible to restrict the lectures to a specific organ, and "plural unification" of subjects is necessary. That is, in the neurological disease course, cerebrovascular disease should be taught by neurology, neurosurgery, pathology and rehabilitation specialists. A further example would be that education on a pituitary tumor should be provided by the departments of both neurosurgery and endocrinology. Furthermore, the integrated medical curriculum can obscure areas that border between subjects, with adverse effects on learning. For example, some diseases cannot be taught based on a single organ. In the case of kidney disease, an example is diabetic nephropathy. In such instances, there should be case-based integration of cardiovascular, endocrine, metabolic, hematologic, renal and genito-urinary courses.

A unified curriculum that includes basic medicine in the neurological diseases course was provided in the syllabus of 11 private medical schools. In addition, several Japanese schools of medicine and universities use the so-called "unified curricula" that combine clinical medicine and basic medicine. Once it has been accepted that it is appropriate to learn about a disease based on symptomatology and physiology, the integrated medical curriculum would appear to be an ideal method of medical education. However, it can be difficult to adjust the content of lectures to fit into the format of an integrated medical curriculum. For an integrated medical curriculum to gain interdisciplinary acceptance, the following must be done. (1) The curriculum should actually be constituted using all medical disciplines related to the specific organ involved in the disease process under study, including both basic medicine and clinical medicine. (2) The rationale for the unified curriculum should be communicated to teachers, so that they will be agreeable to participating in the course. (3) A textbook on the unified curriculum should be developed. (4) Authority to implement and guide the utilization of the integrated medical curriculum should be entrusted to a curriculum com-

mittee. Our office has plans to put forth the effort required to meet these objectives.

In the long run, there are many problems left to be resolved for the future construction of an integrated medical curriculum with the incorporation of information technology<sup>6</sup>. More immediate problems involve eliminating the barriers between departments that impede development of the integrated curriculum and promoting cooperation among departments in teaching such courses.

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(Received, September 19, 2003)

(Accepted, October 8, 2003)

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