

## Biological science education in nursing at Seoul National University I

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### Abstract

There has been considerable devaluing of the acquisition and use of biological science knowledge within the nursing profession. For a more effective nursing profession based on holism, biological science should be adopted to nursing education in a systematic way. It is useful to look through the development of biological science education in nursing at SNU.

There were suggestions to improve biological science education in nursing. Firstly, teaching methods in biological sciences need to be developed by instructors for more effective learning. Secondly, it was necessary that there should be clearer guidelines as to depth and scope of knowledge to be taught from the biological sciences in nursing perspectives. Thirdly, instructors who teach biological sciences in nursing education are required to have their own specialties of biological science with a nursing background and to extend their knowledge base theoretically as well as clinically. Fourthly, specialist programs for biological sciences should be offered in the Graduate School of Nursing and inservice education programs of biological sciences in nursing practice should be prepared.

Finally, a new curriculum of biological science in nursing at SNU was established under the guidance of nurse physiologists (Choe, 1999). Five revised biological sciences such as human structure and function with lab, nutrition and diet, pharmacology in nursing, microbiology in nursing, and pathophysiology, focus on biological knowledge on the basis of nursing science. The syllabus of Human structure and function with lab was presented as continuous endeavors to develop systematic curriculum of biological science education in nursing.

In the future, nursing knowledge would be expanded to other related biological disciplines such as genetics and environmental science.

### Keywords

effective nursing profession, holism, biological sciences in nursing perspectives, develop systematic curriculum of biological science in nursing

### 1. Introduction

#### (1) A unique body of nursing knowledge

The nursing paradigm has been conceptualized as human being, environments, health and nursing care. The hub of nursing activity is the practical interaction of these concepts. It takes place in the dynamic and complex environments for the purpose of wellness of human being. It must be founded on the basis of knowledge from the multiple disciplines such as sociology, philosophy, psychology, biology and physical sciences which should contribute to nursing theory and practice, and be constructed into a unique body of nursing knowledge.

#### (2) Devaluation of biological science knowledge in nursing

As nursing science seeks to establish its identity as a re-

spected profession, and its philosophy changed from that of cure to care based on holism, nursing has established its own independent body of knowledge with biopsychosociological disciplines. However, there has been considerable devaluing of the acquisition and use of biological science knowledge within nursing profession. Akinsanya (1987) has noted that there has been so little interests as to function of biological sciences in nursing practice and, even more so, how they should be structured and taught within the nursing curriculum. The reason for this neglect may lie, in part, in the fact that nursing's theoretical underpinning from biological sciences has been borrowed from medicine and often taught by doctors; textbooks of nurses confirm that the application of biological sciences to

nursing practice is largely derived from medical science.

How can nursing practice be holistic if the biological basis of health and illness and the biological component of nursing interventions are ignored or dismissed?

### (3) The approach to holistic nursing

Whilst the current emphasis upon knowledge from the social sciences and psychology is to be welcomed, nursing profession based on holism can only be achieved if all areas of relevant knowledge are acquired and used in a balanced way.

It was strongly claimed that for more effective nursing profession, biological science should be adopted to nursing education in a systematic way.

## 2. Development of biological science education in nursing at Seoul National University (SNU)

### (1) Circumstances of biological sciences education in nursing at SNU

Circumstances of biological science education in nursing has been very haphazard. For adequate application of biological science to nursing, it is useful to look through the development of biological science education in nursing at SNU.

Since the department of nursing was established in the college of medicine at SNU in 1959, biological sciences such as anatomy, physiology, bacteriology (later, microbiology), pharmacology, pathology which were derived from foundation courses of medicine, were introduced to the curriculum of nursing at SNU without identity of nursing. The curriculum was an imitation and miniature of that of medicine. The situations of biological science education in the most Korean nursing schools was similar (Korean council of college education, 1990).

As a finding (Courtenay, 1991) showed, nursing students and teachers often felt that they didn't have enough background knowledge to understand biological sciences. Nursing students had anxieties about the ineffectiveness of teaching of biological science. This was primarily due to students being taught theoretically and the difficulty in seeing relevance to tasks they performed in the clinical setting.

The study (Choe, 1997) identifying the degree of students' satisfaction with biological sciences education in nursing, demonstrated that nursing students were dissatisfied with the content of lectures, textbook, lecture style and atti-

tude of instructors. They pointed out that "focus and style of lecture was not organized in a systematic and effective way"; they had a hardship to cope with inconsistency of lecture due to frequent changes of instructors. They complained that instructors had no sincere attitude and the content of lecture was less connected with nursing science. Most of the graduates haven't had systematic knowledge on the biological aspects of human phenomena.

### (2) Matters on the biological sciences education in nursing

On the basis of the findings, there were noticed several matters on the biological science education in nursing. Firstly, nursing students haven't acquired systematic knowledge on the biological aspects of human phenomena. The content of knowledge from the biological science related to nursing practice was ill defined and its application to the nursing practice was unstructured.

Secondly, it was also a matter who taught biological sciences to nursing students. Non-nurse instructors with a background of biological sciences or medicine have involved in teaching nursing students. Biological scientists or medical faculty taught these subjects only within the scope of biological science or medicine, not in the context of nursing. In this regard, nursing students have difficulty in applying theoretical basis of biological sciences to nursing practice. Due to lack of communication about the content of the biological science in nursing between nursing faculty and non-nursing instructors (biologist or medical faculty), the overlap of content of biological sciences during the course work of nursing happened often.

Frequent change of non-nurse instructors made it impossible to keep consistency of lecture and to reflect the evaluation of teaching. It was also difficult for students to cope with and it took lots of time and energy to develop an adequate curriculum of the biological sciences in nursing education.

There were nurse teachers without specialty in biological science felt lack of knowledge in teaching biological science. How can nurse instructors give the students an adequate knowledge from which to base their practice, if they themselves do not feel adequately prepared?

A study (Choe, 1999), however, showed that teaching by nurse specialized in biological science such as physiology improved degree of nursing students' satisfaction with

their lectures. It was the reason that nurse physiologists gave structured knowledge basis from biological science to nursing practice.

(3) Suggestions to improve effectiveness of biological science education in nursing

With regard to the effectiveness of learning from biological science in nursing, there was lack of applications of various teaching methods used in biological science education in nursing.

As a result of the findings, it was necessary that there should be clearer guidelines as to depth and scope of knowledge to be taught from the biological sciences in the nursing perspectives.

Instructors who teach biological sciences in nursing education are required to have their own specialties of biological sciences with nursing background and to extend their knowledge base theoretically as well as clinically. Accordingly, specialist programs for biological nursing should be offered in graduate school of nursing.

Inservice education programs of biological sciences in nursing practice should be prepared for clinical nurses in order to apply theoretical knowledge from biological sciences to nursing practice effectively.

The various effective teaching methods used in biological science education, need to be developed by instructors in order that effective learning can take place.

(4) New curriculum of biological sciences in nursing at SNU

In the necessity to develop adequate biological science education in nursing at SNU on the basis of nursing science, new curriculum of biological sciences was established under the guidance of nurse physiologists (Choe,1999). Five revised biological sciences in the nursing perspectives which were very different from the past medical model, have been provided for sophomore students.

There are five biological sciences revised from the subjects of the past medical model; Human Structure and Function with lab revised from Anatomy and Physiology with lab, Nutrition and Diet from biochemistry, Pharmacology in nursing from Introduction to Pharmacology, Microbiology in nursing from Microbiology and lab, and Pathophysiology from Pathology (appendix 1). With the notice of their titles, subjects focus on biological knowledge not on the basis of medical or biological science itself, but nursing sci-

ence.

Two nurse physiologists involve in teaching of four subjects except microbiology in nursing. Microbiology in nursing is taught by faculties of microbiology in college of medicine. Two nurse physiologists discuss with faculties of microbiology in college of medicine to adjust the depth and scope of lecture and lab for nursing students.

Students feedback in the course evaluation following the completion of courses are gathered and delivered to faculty of microbiology as well as nurse physiologists who involve in four other biological sciences.

As one of the curriculum of biological sciences in nursing at SNU, the syllabus of Human Structure and Function with lab is presented below.

3. Syllabus of Human Structure and Function and lab (4 credit hours)

(1) Course description

New syllabus of Human Structure and Function and lab (appendix 2) was structured in the perspectives of nursing (1999). The Human Structure and Function is a course to describe a comprehensive knowledge in human structure and physiologic functions. Information gained in the course will prepare the student for pathophysiology, pharmacology, and clinical nursing courses related to the diagnosis and management of diseases.

(2) Course objectives

Objectives of the course are to demonstrate knowledge of the structure and function of the body which is oriented to nursing diagnoses, to correlate the physiologic function of the body with the structure of the body, and to apply the physiologic principles to understanding of pathophysiology and pharmacology .

(3) Textbook

Human Structure and Functions (Choe et al. 2nd Ed., Kechuk Moonwha Sa., 2001. written in Korean) are used as textbooks. This book has been published by the cowork of nurse physiologists in Korea based on Human Anatomy and Physiology (Elaine Marieb. 3rd ED. ,The Benjamin/Cummings Publishing Company, Inc, 1995).

(4) Teaching strategy and evaluation

Teaching strategies are lecture , laboratory and discussion and students are evaluated with attendance 10%, ex-

ams 60% and lab 30%.

(5) Lecture schedule and related nursing diagnoses

Week	Contents of lecture	Related nursing diagnosis
1 wk	Structure and function of the cell; cell, tissue, movement through the plasma membrane	Impaired tissue integrity
2 wk	The concepts of Covering, Support and Movement (I) including integumentary system, bone and bone tissue, skeletal system and joint	Impaired skin integrity, Risk for impaired skin integrity, Activity intolerance, and risk for activity intolerance
3 wk	Covering, Support and Movement (II); muscular system (histology and physiology), muscular system; gross anatomy	Disuse syndrome, risk for disuse syndrome, activity intolerance and risk for activity intolerance
4 wk	Integration and Control system (I); Functional Organization of Nervous Tissue, Central Nervous System and Peripheral Nervous System and Reflex reaction	Alteration of reflex, sensory and sleep
5 wk	Integration and Control System (II); Autonomic Nervous System, Nervous Integration and The Senses	Alteration of reflex, sensory and sleep
6 wk	Integration and Control System (III); Endocrine Glands	Alteration of growth and development and sexual dysfunction.
7 wk	Regulation and Maintenance (I); Cardiovascular System: Blood and Cardiovascular System: The Heart	Decreased cardiac output, Change of tissue perfusion.
8 wk	Intermediate Exam	
9 wk	Regulation and Maintenance (II); Cardiovascular System: Peripheral Circulation and Regulation; Lymphatic System	Alteration of peripheral nervous system
10 wk	Regulation and Maintenance (III); Non-specific Defensive Mechanism and Immunity; Respiratory System	Risk of infection, patent airway, Risk for aspiration, risk for asphyxia, inappropriate respiratory function, and alteration of gas exchange
11 wk	Regulation and Maintenance (IV); Digestive system	Constipation and diarrhea.
12 wk	Regulation and Maintenance (V); Nutrition, Metabolism and Temperature Regulation	Alteration of body temperature Undernutrition, overnutrition, and risk of overnutrition.
13 wk	Regulation and Maintenance (VI); Urinary system	Alteration of micturition, Urinary retention.
14 wk	Regulation and Maintenance (VII); Water, Electrolytes and Acid-Base Balance	Body fluid deficit, and body fluid overload.
15 wk	Reproduction and Development; Reproductive System, Development, Growth, Aging and Genetics	Decreased defense ability, Alteration of growth and genetics
16 wk	Final Exam	

(6) Laboratory

The Human Structure and Function with Laboratory is a course to provide a better understanding of human structure and functions. The lab consists of three physiology laboratories and five anatomy labs. Anatomy is best appreciated through direct observation of the human cadaver. We also utilize a coloring book for self study of human structure.

Each lab will begin with a brief introduction including the explanation of the experiments for the day. All labs will take approximately 2-3 hours. After the completion of each lab, students are required to complete a report and hand it in by following lab.

Physiology lab is composed of three sessions of Osmotic Hemolysis, EKG and Spirometry. Anatomy lab with human cadaver consists of five sessions of observation and identification of the organs of bone and muscles, head and neck, digestive systems, heart and brain. Human cadaver is shared with medical students of college of medicine.

4. Conclusions

Continuous endeavor to develop systematic curriculum of biological science education in nursing would increase students' satisfaction and get rid of the overlap of contents among biological sciences. Applications of structured knowledge from biological sciences to nursing science and practice would enhance nursing students and clinical nurses' self confidences.

Now world is changing very fast. The recent trends in the world need to expand basis of nursing knowledge to other biological disciplines such as genetics and environmental science.

References

Akinsanya, J.A. (1987). The life sciences in nursing: development of a theoretical model. *Journal of Advanced Nursing*, 12:267-274.

Choe, M.A., Shin, G.S. (1999). Objectives and contents of basic medical sciences in nursing education. *The Journal of Academy of Nursing*, 29(6):1455-1468.

Choe, M.A., Shin, G.S. (1997). A study on the current status of the curriculum operation of the basic medical sciences in nursing education. *The journal of academy of nursing*, 27(4):975-987.

Courtenay, M. (1991). A study of the teaching and learning of the biological sciences in nurse education. *Journal of Advanced Nursing*, 16, 1110-1116.

Hwang, A.R. (1999). An approach of biological nursing education in nursing education, workshop sponsored by Korean Society of Biological Nursing Science.

Korean council of college education (1990). A comprehensive report on the evaluation of nursing department. Korean Council of College Education.

(Appendix 1)

Sophomore year		Credit-Hours-Lab hours
Human structure and function with lab		4 - 3 - 2
Nutrition and Diet		2 - 2 - 0
Pathophysiology		4 - 4 - 0
Microbiology in nursing		2 - 2 - 0
Pharmacology in nursing		2 - 2 - 0
Total		14 - 13 - 2
Past		Present
Anatomy	2 - 2 - 0	Human structure and function/lab
Physiology and Lab	3 - 2 - 0	
Biochemistry and Lab	3 - 2 - 2	Nutrition and Diet
Introduction to Pharmacology	2 - 2 - 0	Pharmacology in nursing
Microbiology and Lab	3 - 2 - 2	Microbiology in nursing
Pathology	2 - 2 - 0	Pathophysiology

(Appendix 2)

Human Structure and Function with lab  
 Course description  
 This course is designed to provide the student with a comprehensive knowledge in human structure and physiologic functions. Information gained in this course will prepare the student for pathophysiology, pharmacology, and clinical nursing courses related to the diagnosis and management of diseases.  
 Objectives

1. To demonstrate knowledge of the structure and function of the body.
2. To correlate the physiologic function of the body with the structure of the body.
3. To apply the physiologic principles to understanding of pathophysiology and pharmacology.

Teaching Strategies ; Lecture, Laboratory, Discussion

Textbook

1. Human Anatomy and Physiology. 3rd Edition. Elaine Marieb. The Benjamin/Cummings Publishing Company, Inc, 1995.

2. Human Structure and Functions. (in Korea) 2nd Edition. Choe et al. Kechuk Moonwha Sa. 2001.

Evaluation

- |                  |     |
|------------------|-----|
| 1. Attendance    | 10% |
| 2. Exams(2)      | 60% |
| 3. Laboratory(8) | 30% |

Lecture Schedule

Week 1 Structure and Function of the cell

1) Cell

2) Tissue

3) Movement Through the Plasma membrane

Week 2 Covering, Support and Movement (I)

1) Integumentary System

2) Bone and Bone Tissue

3) Skeletal System

4) Joint

Week 3 Covering, Support and Movement (II)

5) Muscular System: Histology and Physiology

6) Muscular System: Gross Anatomy

Week 4 Integration and Control Systems (I)

1) Functional Organization of Nervous Tissue

2) Central Nervous System

3) Peripheral Nervous System and Reflex reaction

Week 5 Integration and Control System (II)

4) Autonomic Nervous System

5) Nervous Integration

6) The Senses

Week 6 Integration and Control System (III)

7) Endocrine Glands

Week 7 Regulation and Maintenance (I)

1) Cardiovascular System: Blood

2) Cardiovascular System: The Heart

Week 8 Intermediate Exam

Week 9 Regulation and Maintenance (II)

3) Cardiovascular System: Peripheral Circulation and Regulation

4) Lymphatic System

Week 10 Regulation and Maintenance (III)

5) Non-specific Defensive Mechanism and Immunity

6) Respiratory System

Week 11 Regulation and Maintenance (IV)

7) Digestive System

Week 12 Regulation and Maintenance (V)

8) Nutrition, Metabolism and Temperature Regulation

Week 13 Regulation and Maintenance (VI)

9) Urinary System

Week 14 Regulation and Maintenance (VII)

10) Water, Electrolytes and Acid-Base Balance

Week 15 Reproduction and Development

1) Reproductive System

2) Development

3) Growth

4) Aging

5) Genetics

Week 16 Final Exam



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