



De La Salle University – Dasmariñas

GRADUATE PROGRAM

**A PROPOSED SET OF STANDARD CORE COMPETENCIES
FOR RADIOLOGIC TECHNOLOGY INTERNS**

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ABSTRACT

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STATEMENT OF THE PROBLEM:

This study is primarily aimed at identifying the core competencies that should be learned by radiologic technology interns. Such core competencies provide them a more structured internship training program that is geared towards developing and improving competencies needed for them to practice effectively in the workplace.

Specifically, this study answered the following specific questions:

1. What are the competencies needed by the radiologic technology interns as determined by the radiologic technologists and the radiologic technology interns themselves in:

- 1.1 general radiography,



- 1.2 ultrasound.
- 1.3 computed tomography,
- 1.4 magnetic resonance imaging,
- 1.5 interventional radiology, and
- 1.6 radiotherapy?

2. Are there significant differences on the identified core competencies as determined by the radiologic technologists and radiologic technology interns?

3. What is the proposed set of standard core competencies for radiologic technology interns?

It was hypothesized that there were no significant differences on the identified core competencies needed by the radiologic technology interns as determined by the radiologic technologists and radiologic technology interns.

It was also assumed that there is no set of written standards of core competencies for radiologic technology interns; that higher education institutions offering RT Education would make use of the standard core competencies as a guide for training and evaluation of the radiologic technology interns; and that the product of this research would be used by the CHED as a guide to strengthen the standards governing internship training and evaluation of the radiologic technology interns.



SCOPE AND COVERAGE

This study, conducted in SY 2004-2005, focused on identifying the core competencies that should be learned/mastered by the radiologic technology students during their internship training. It included competencies on the following imaging and therapeutic modalities: General Radiography (GR), Ultrasound (UTZ), Computed Tomography (CT), Magnetic Resonance Imaging (MRI), Interventional Radiology (IR), and Radiotherapy (RT). Competencies under the four domains of skilled activity were also investigated: cognitive, psychomotor, reactive and interactive.

The respondents of the study were composed of radiologic technologists and radiologic technology interns in different affiliating hospitals located in the National Capital Region (NCR).

METHODOLOGY:

The study utilized the descriptive type of research. Documentary analysis and normative survey were used to gather the needed data.

Documentary analysis was used to obtain information regarding the core competencies of radiologic technologists in six imaging modalities. Relevant documents such as those pertaining to internship training, competency requirements, practiced standards were used, which are mostly from foreign materials as no locally publish documents are available. The obtained information was used to develop the questionnaire used in the



study. To test its validity and reliability, the questionnaire was subjected to both face and content validity and then pilot tested.

The questionnaires were then administered to radiologic technologists and RT interns assigned in affiliating hospitals in NCR.

Mean, standard deviation and Mann-Whitney U-test were the statistical tools used in the study.

As a standard, mean ratings equal to or greater than 3.40 verbally interpreted as highly needed and extremely needed were classified as the more important competencies. The following guidelines were used in choosing the competencies included in the Proposed Set of Standard Core Competencies for Radiologic Technology Interns: Both groups should rate the competency equal to or above the standard of 3.40, and those despite a low rating from one of the groups of respondents reveals no significant differences when the responses of the two groups were subjected to a test of difference.

Further, competencies rated by both groups of respondents as extremely needed were given greater emphasis as these were believed to be the most frequent and critical competencies being applied in the workplace.



MAJOR FINDINGS:

The following findings were drawn from the study:

1. The competencies needed by the radiologic technologists in the six imaging and therapeutic modalities were the following:

General Radiography

All (100%) competencies for general radiography were judged by the respondents to be needed because they obtained mean ratings above 1.80. However, only 50 (98.04%) competencies obtained mean rating equal to or above the set standard of 3.40 from the 2 groups of respondents. These competencies were classified as more important competencies and were automatically included in the Proposed Set of Standard Core Competencies for Radiologic Technology Interns. Furthermore, 32 or 62.75% of these competencies were rated above 4.20 interpreted as extremely needed. Psychomotor competency number 3 obtained mean rating of 3.16 from radiologic technologists interpreted as needed, which is below the standard mean of 3.40.

Ultrasound

All 44 (100%) competencies for ultrasound were judged by the respondents to be needed because they obtained mean ratings above 1.80. However, only 36 (81.82%) obtained mean rating equal to or above the set standard of 3.40 from the 2 groups of respondents. These competencies



were classified as more important competencies, and were automatically included in the proposed set of standard core competencies. Furthermore, 13 or 29.55% of these competencies were rated by the respondents above 4.20 interpreted as extremely needed.

The other eight competencies, items number 3, 10, 11, 13, 14, and 15 for psychomotor domain, and items number 3 and 8 for interactive competency, obtained mean ratings between 2.78 and 3.33 interpreted as needed from radiologic technologists which is below the standard mean of 3.40.

Computed Tomography

All (100%) competencies for computed tomography were judged by the respondents to be needed as they obtained mean ratings above 1.80. However, only 49 (98.00%) out of these 50 competencies obtained mean rating equal to or above the set standard of 3.40 from the two groups of respondents. These competencies were classified as more important competencies and automatically included in the proposed standard core competencies. Furthermore, there are 23 (46.00%) competencies which obtained mean above 4.20 interpreted as extremely needed when the respondents were taken as a whole.



Psychomotor competency number 3 obtained mean rating of 3.24 from radiologic technologists interpreted as needed which is below the standard mean of 3.40.

Magnetic Resonance Imaging

All (100%) competencies for magnetic resonance imaging were assessed by the respondents to be needed because they obtained mean ratings above 1.80. However, only 50 (96.15%) out of these 52 competencies obtained mean ratings equal to or above the set standard of 3.40 from the 2 groups of respondents. These competencies were classified as more important competencies and were automatically included in the proposed set of standard core competencies. Twenty one (40.28%) of these competencies obtained mean ratings above 4.20 interpreted as extremely needed when the respondents were taken as a whole.

Psychomotor competency number 7 obtained a mean rating below the standard of 3.40 from both groups of respondents and therefore was automatically excluded from the proposal. On the other hand, psychomotor competency number 20, obtained a mean rating of 3.20 which is lower than the set standard.

Interventional Radiology

All 45 (100%) competencies for interventional radiology were judged by the respondents to be needed as they obtained mean ratings above



1.80. However, only 35 or 77.78% obtained mean ratings equal to or above the set standard of 3.40 from the 2 groups of respondents. These competencies were classified as more important competencies and were automatically included in the proposed set of standard core competencies. Furthermore, 21 (46.67%) of these competencies were rated by the respondents above 4.20 interpreted as extremely needed.

Ten competencies, obtained mean ratings between 2.50 and 3.33 from radiologic technologists interpreted as slightly needed or needed. These competencies were: item number 7 for cognitive competencies, items number 5, 6, and 17 for psychomotor competencies, and items number 2, 3, 4, 5, 7, and 8 for interactive competencies.

Radiotherapy

Furthermore, all 60 (100%) competencies for radiotherapy were judged by the respondents to be needed because they obtained mean ratings above 1.80. However, only 42 (70.00%) obtained mean ratings equal to or above the set standard of 3.40 from the 2 groups of respondents. These competencies were classified as more important competencies and were automatically included in the proposed set of standard core competencies. Furthermore, there were 14 (23.33%) competencies that were rated by the respondents above 4.20 interpreted as extremely needed.



The other eighteen competencies, obtained mean ratings between 2.64 and 3.36 from radiologic technologists interpreted as needed. These competencies were: item number 4 and 5 for cognitive domain; item number 1, 2, 7, 8, 9, 12, 13, 15, 24, 25, 26, 27, 29, 34, and 35 for psychomotor domain, and item number 4 for interactive domain.

All competencies that obtained mean ratings below the set standard of 3.40 were further subjected to a test of difference. Competencies were included in the Proposed Set of Standard Core Competencies if the test reveals no significant difference on the responses of the two groups of respondents.

2. The test of differences between the responses of the two groups of respondents revealed the following:

General Radiography

The Mann-Whitney U-test for cognitive competencies in general radiography was 1.290 with a significant level of 0.197 interpreted as not significant. For psychomotor competencies, the U-test was 1.120 with a significant level of 0.263 interpreted as not significant. For reactive competencies the Mann-Whitney U-test was 2.379 with a significant level of 0.017, which was significant at 5% level. And for interactive competencies, Mann-Whitney U-test was 2.982 with a significant level of 0.003, which was highly significant at 1% level. Therefore the null hypotheses of no



significant differences were accepted for cognitive and psychomotor competencies, and rejected for reactive and interactive competencies.

Further, psychomotor competency number 3 had a computed Mann-Whitney U-test of 3.080 with a significant level of 0.000, which was significant at 1% level. Therefore psychomotor competency number 1 was excluded from the Proposed Set of Standard Core Competencies for Radiologic Technology Interns.

Ultrasound

The results of the Mann-Whitney U-test for ultrasound were as follows: 0.387 with a significant level of 0.699 for cognitive competencies; 0.937 with a significant level of 0.349 for psychomotor competencies, 0.766 with a significant level of 0.443 for reactive, and 1.659 with a significant level of 0.097 for interactive competencies, all were interpreted as not significant. Therefore, the null hypotheses of no significant differences were accepted for all domains for ultrasound.

Further, the computed Mann-Whitney U-test for psychomotor competencies number 3, 10, 11, 13, and 15 were 1.362, 1.215, 1.215, 1.927, and 1.011 respectively, and for interactive competency number 8 was 1.361, all with significant levels above 0.05 interpreted as not significant. These competencies were included in the proposed set of core competencies. On the other hand, psychomotor competency number 14



obtained a Mann-Whitney U-test of 2.660 with significant level of 0.008 which was highly significant at 1% level, and interactive competency number 3 obtained a Mann-Whitney U-test of 2.176 with significant level of 0.030 which was significant at 5% level. Both competencies were excluded from the proposed set of core competencies.

Computed Tomography

The Mann-Whitney U-test of the responses of radiologic technologists and RT interns for cognitive competencies was 1.104, for psychomotor competencies was 0.030, for reactive competencies 1.070 and for interactive competencies was 0.419, all with a significant levels above 0.05 interpreted as not significant. Therefore the null hypotheses of no significant differences were accepted for cognitive, psychomotor, reactive and interactive competencies for computed tomography.

Furthermore, psychomotor competency number 3 has a computed Mann-Whitney U-test of 2.121 with a significant level of 0.034, which was significant at 5%. This competency was excluded from the proposed set of standard core competencies.

Magnetic Resonance Imaging

The results of the Mann-Whitney U-test for cognitive competencies was 0.263, for psychomotor competencies was 0.087, for reactive competencies was 0.278, and for interactive competencies was 0.175, all



with significant levels above 0.05 interpreted as not significant. Therefore the null hypotheses of no significant differences were accepted for cognitive, psychomotor, reactive and interactive competencies for magnetic resonance imaging.

Further, test of difference revealed that psychomotor competency number 20 obtained a Mann-Whitney U test of 0.751 with significant level of 0.453, which was interpreted as not significant. Therefore, this competency was included in the proposal.

Interventional Radiology

The results of the Mann-Whitney U-test for interventional radiography were as follows: 0.136 for cognitive competencies, 0.647 for psychomotor competencies, 0.221 for reactive competencies and 1.324 for interactive competencies, with significant levels above 0.05 interpreted as not significant. Therefore the null hypotheses of no significant differences were accepted for cognitive, psychomotor, reactive and interactive competencies for interventional radiology.

Further, test of differences revealed that the obtained Mann-Whitney U-test for cognitive competency number 7 was 1.259 with significant level of 0.208 interpreted as not significant. Psychomotor competencies numbers 5, 6 and 17, obtained Mann-Whitney U-test of 1.609, 1.643, and 1.248 respectively, all with significant levels above 0.05 interpreted as not



significant. For interactive competencies numbers 2,4,5,7. and 9 the obtained Mann-Whitney U-test were 1.875, 1.709, 1.097, 1.318, and 0.249 respectively, all had a significant levels above 0.05 and were interpreted as not significant. All above-mentioned competencies will be included in the proposed set of standard core competencies. On the other hand, interactive competency number 3 obtained a Mann-Whitney U-test of 2.123 with significant level of 0.034, which was significant at 5% level; therefore, it will be excluded from the proposal.

Radiotherapy

The Mann-Whitney U-test for cognitive competencies was 2.735 with a significant level of 0.006, which is highly significant at 1% level. For psychomotor competencies, the Mann Whitney U-test was 1.773 with a significant level of 0.076; for reactive competencies the Mann-Whitney U-test was 1.013 with a significant level of 0.311; and for interactive competencies the Mann-Whitney U-test was 2.982 with a significant level of 0.003, all were interpreted as not significant. Therefore the null hypothesis of no significant differences was accepted for psychomotor, reactive and interactive competencies, and rejected for cognitive competencies.

Further, test of difference revealed that psychomotor competencies number 7, 15, 25, 26, 34, and 35 obtained a Mann-Whitney U-test of 1.632, 1.846, 1.371, 1.484, 2.082, and 0.822 respectively, all with significant levels



above 0.05 interpreted as not significant. These competencies were included in the proposed set of standard core competencies.

On the other hand, the obtained Mann-Whitney U-test for cognitive competencies number 4 and 5 were 2.548 and 2.462 respectively, with significant levels below 0.05 interpreted as significant at 5% level. For psychomotor competencies number 1, 2, 8, 9, 24, 27 and 29, the obtained Mann-Whitney U-test were 2.104, 2.062, 2.154, 2.101, 2.436, 2.183 and 2.592 respectively, all with significant level below 0.05 which was interpreted as significant at 5% level. Interactive competency number 4 obtained a Mann-Whitney U-test of 2.066 with significant level of 0.039, which was significant at 5% level. Psychomotor competencies number 12 and 13 obtained a Mann-Whitney U-test of 3.252 and 4.425 respectively, both with significant levels below 0.01, which was interpreted as highly significant at 1%. These competencies were excluded from the Proposed Set of Standard Core Competencies for Radiologic Technology Interns.

3. After careful analysis, 50 competencies for general radiography were included in the Proposed Set of Standard Core Competencies for Radiologic Technology Interns. They were grouped into: 9 cognitive, 23 psychomotor, 8 reactive and 10 interactive competencies. Psychomotor competency number 3 was excluded.



For ultrasound, 42 out of the total of 44 competencies were included in the proposed set of core competencies, which is grouped into: 10 cognitive, 14 psychomotor, 8 reactive and 10 interactive competencies. Psychomotor competency number 14, and interactive competency number were excluded.

For computed tomography, 49 competencies were included out of the total of 50. They were grouped into: 12 cognitive, 19 psychomotor, 8 reactive and 10 interactive competencies. Psychomotor competency number 3 was also excluded.

For magnetic resonance imaging, out of the 52 competencies 51 were included in the proposed set of standard core competencies. They were grouped into: 9 cognitive, 23 psychomotor, 8 reactive, and 11 interactive competencies. Psychomotor competency number 7 was excluded.

For interventional radiology, 44 out of the 45 competencies grouped into: 7 cognitive, 21 psychomotor, 7 reactive, and 9 interactive competencies were included. Interactive competency number 3 was excluded.

For radiotherapy, 48 were included out of the total of 60 competencies. They were grouped into: 4 cognitive, 26, psychomotor, 8 reactive, and 10 interactive. Cognitive competency numbers 4, and 5,



psychomotor competency numbers 1, 2, 8, 9, 12, 13, 25, and 27. and interactive competency number 5, were all excluded from the Proposed Set of Standard Core Competencies for Radiologic Technology Interns.

4. Although there were only 3 major problems in the study, it is worthy to note that there were other findings revealed by this study:

All (15 or 100%) affiliating hospitals had general radiography, 14 or 93% had ultrasound, 12 or 80% had computed tomography, 4 or 27% had magnetic resonance imaging, 3 or 20% had interventional radiology and 3 or 20% had radiotherapy.

Out of the 163 respondent radiologic technologists, 107 were assigned in general radiography, 9 in ultrasound, 22 in computed tomography, 5 in magnetic resonance imaging, 6 in interventional radiology, and 14 in radiotherapy.

All respondent interns (115 or 100%) have been assigned in general radiography; 65 or 56.52% of them have been assigned in ultrasound; 59 or 51.30% have been assigned in computed tomography; 15 or 13.04% in magnetic resonance imaging; 24 or 20.87% in interventional radiology; and 21 or 26.96% have been assigned in radiotherapy. Further, the length of training (average number of weeks) spent by radiologic technology interns assigned in specific modalities were as follows: 25 weeks for general radiography, 3 weeks for ultrasound and computed tomography, 2 weeks in



magnetic resonance imaging and radiotherapy. and 1 week for interventional radiology.

CONCLUSIONS:

After careful consideration on the findings of the study, the following conclusions were drawn:

1. All competencies found in the questionnaire in the six imaging and therapeutic modalities were assessed by the respondents as needed, which clearly indicated that the respondents acknowledged the need to integrate and apply these competencies in the training of interns to produce graduates who are globally competitive.

Almost all competencies were classified as more important competencies and fundamental to the work of radiologic technologists, and automatically included in the Proposed Set of Standard Core Competencies for Radiologic Technology Interns.

Further, the respondents rated majority of the competencies as extremely needed, which indicated that majority of them were applied on a day-to-day basis or critical to the success of radiological procedures.

2. As a whole, radiologic technologists and RT interns had somewhat the same assessment of the competencies, in four domains and in all six imaging and therapeutic modalities, that radiologic technology interns need to learn and master during their internship training program.



This clearly indicates that RT interns have somewhat the same understanding as radiologic technologists of what constitutes professional practice despite the brief training period they spent in the actual workplace setting.

Further, there were 22 competencies which were later included in the proposed set of core competencies as the Mann-Whitney U-test revealed no significant differences on the responses of radiologic technologists and radiologic technology interns.

3. The Proposed Set of Standard Core Competencies for Radiologic technology Interns includes: 50 competencies for general radiography, 42 for ultrasound, 49 for computed tomography, 52 for magnetic resonance imaging, 44 for interventional radiology and 48 for radiotherapy. Eighteen (18) competencies were excluded from the proposal.

4. There were only few affiliating hospitals that had magnetic resonance imaging, interventional radiology and radiotherapy. Likewise, they had few trained radiologic technologists working in these modalities.

Moreover, only few RT interns have been assigned in magnetic resonance imaging, interventional radiology and radiotherapy and they spent only a few weeks in these modalities together with ultrasound and computed tomography. They were only allowed to do clerical task.