Second-Year Nursing Students' Retention of Gross Anatomical Knowledge

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Introduction

- Human anatomy and physiology are considered foundational courses in health-related disciplines (Young et al., 2016). However, emerging evidence suggests that there is great difficulty not only in transferring fundamental anatomical knowledge to theory/clinical application but also a loss of knowledge over time (Doomernik et al., 2017; Easteal and Perry, 2018).
- Most of the knowledge transfer, loss and/or retention studies have been carried out in medical, physical therapy and chiropractic students, and this phenomenon has not yet been assessed in nursing students. This study seeks to determine the percent of anatomical knowledge retained by second-year nursing students, and to determine which areas of anatomy have the greatest and lowest levels of retention.

Methods

- This study was conducted in the Winter 2018 semester with a class of 29 students. Quizzes were created using an online quizzing platform called Kahoot (Kahoot Inc., Oslo, Norway) to assess knowledge retention. The quizzes were not used for marks, and students were encouraged not to study for them in advance. Between nine and eleven multiple-choice questions reflecting first year knowledge from each major organ system were developed into eleven Kahoots.
- The pooled data from the first-year anatomy course and the second-year health assessment course were subjected to statistical evaluation using SPSS II (IBM Corp; Armonk, NY) to determine overall knowledge loss. Means were compared using 2-sample 't' tests. Significant differences were considered at $P<0.05$.

Results

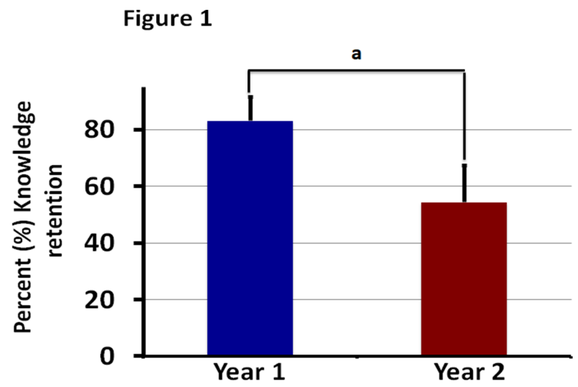
- The mean score for all organ systems in year one was 83.08±8.354 (SD) which was significantly decreased to 54.36±12.9 (SD) by the second-year health assessment course. This equates to a 28.7% knowledge loss within one year (Figure 1).
- Knowledge retention was highest for the respiratory, gastrointestinal, skin and genitourinary systems (80-88%). This was followed by the musculoskeletal, nervous system, and special senses (65-79%).
- Retention was significantly lower ($P<0.001$) for head and neck, the vascular system, cranial nerves, and the lymphatic system (42-64%) (Table 1).

Table 1. Retention by Organ System

Organ System	Year 1 Mean ± SD	Year 2 Mean ± SD	Knowledge Loss	P-Values
Integumentary	90.6 ± 6.8	70.7 ± 25.4	19.9%	.093
Head & Neck	91.4 ± 11.7	34.02 ± 25.6	57.4%	.001
Special Senses	88.4 ± 6.9	67.08 ± 22.9	20.6%	.059
Gastrointestinal	63.6 ± 6.9	53.34 ± 14.9	10.3%	.014
Respiratory	72.9 ± 5.8	61.43 ± 22.1	11.5%	.249
Cardiovascular	83.5 ± 5.4	37.39 ± 21.4	46.1%	.0001
Nervous System	83.9 ± 8.1	58.77 ± 19.6	25.1%	.0001
Cranial Nerves	88.2 ± 4.4	47.01 ± 19.5	41.2%	.0001
Musculoskeletal	88.0 ± 7.0	57.27 ± 32.9	30.7%	.006
Lymphatics	82.6 ± 2.8	46.91 ± 21.0	35.7%	.001
Genitourinary	80.4 ± 16.4	64.0 ± 28.1	16.4%	.121

Results

Figure 1. The Summary of Overall Retention



Year 1 and Year 2 bars represent the overall mean scores from all organ systems converted into percent knowledge. There is a significant decrease in knowledge between years 1 and 2 ($P<0.001$).

Discussion

- The significant differences between knowledge retention in the second year largely depended upon the individual organ system being assessed.
- These differences in knowledge retention may be attributed to the level of difficulty of the questions, the time period between time learned and time tested, or students' perceived usefulness of the information.
- Future studies could investigate the variables that impact specific system knowledge retention and the interventions that might improve those retention levels.
- Overall, the results of this study are consistent with other studies of medical students that reported an average 33% loss of anatomical knowledge within one year (Custers, 2010).

Conclusion

- In conclusion, the retention of anatomical knowledge varied by body system, and the overall loss of 28.7% is consistent with results reported in studies of medical and allied health professional students.
- While the loss is consistent with other disciplines, it does raise the concern of how much anatomical knowledge is retained by students throughout their program and by registered nurses once they enter practice.
- Studies are currently underway to evaluate anatomical knowledge retention in third and fourth year nursing students.
- Future studies could involve the development and evaluation of teaching strategies to increase the level of anatomical knowledge retention in health disciplines.

References

- Custers EJ. 2010. Long-term retention of basic science knowledge: A review. Adv Health Sci Edu Theory Pract 15:109–128.
- Doomernik DE, van Goor H, Kooloos JG, Ten Broek RP. 2017. Longitudinal retention of anatomical knowledge in second-year medical students. Anat Sci Educ 10:242–248.
- Easteal R, Perry C. 2018. Teaching and learning for long-term retention. FASEB J 32:S508.
- Young JQ, van Dijk SM, O'Sullivan PS, Custers EJ, Irby DM, Ten Cate O. 2016. Influence of learner knowledge and case complexity on handover accuracy and cognitive load: Results from a simulation study. Med Educ 50:969–978.