Physiological Knowledge Retention in Second-Year Nursing Students

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Introduction

- Despite anatomy and physiology being foundational courses in medical, allied-health and nursing programs, there is growing concern that students are not retaining the essential bioscience knowledge in these courses over time (McVicar et al., 2015).
- Numerous studies have demonstrated the difficulty of medical, nursing, and allied health care students to retain and apply anatomical knowledge as they progress through their programs of study (Narnaware & Neumeier, 2020b).
- However, physiological knowledge retention has not been studied as extensively as anatomical knowledge retention in health care disciplines, with very few studies focusing on nursing students (Aari et al., 2004). Of those studies, most are carried out after graduation (Aari et al., 2004) or are focused on a single or limited number of organ systems (Pourshanazari et al., 2013).

Purpose

- The present study aims to determine the level of physiological knowledge retained by nursing students in the second year between completing their physiology course in first-year nursing and enrollment in the second-year pathophysiology course.

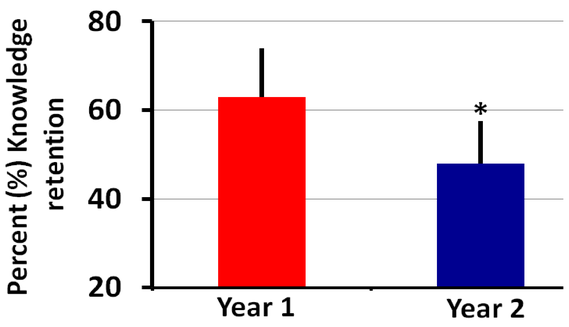
Methods

- The present study was conducted in the Fall 2019 semester with a class of 21 students. Quizzes were created using an online quizzing platform called Kahoot (Kahoot Inc., Oslo, Norway) to assess physiological knowledge retention. The students were encouraged not to study for Kahoot quizzes in advance. Between nine and eleven multiple-choice questions reflecting first-year knowledge from each major organ system were developed into ten Kahoots.
- The pooled data from the first-year physiology course and the second pathophysiology course were subjected to statistical evaluation using SPSS II (IBM Corp; Armonk, NY) to determine overall knowledge retention. Means were compared using 2-sample 't' tests. Significant differences were considered at P<0.05.

Results

- The mean score of questions from ten organ systems in year one was 62.85 ± 10.5 (±SD). Comparing this score to match test items evaluated in the second-year pathophysiology course, there is a decrease in the overall mean score from 62.85 ± 10.5 (±SD) to 47.95 ± 9.2 (±SD), accounting for a 14.9% knowledge loss within one year (**Figure 1**).

Figure 1. The Summary of Overall Retention



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

Table 1. Retention by Organ System

Organ system (Physiology)	Year 1 Mean ± SD	Year 2 Mean ± SD	% knowledge lost	t test/ p values
Vascular	66.98 ± 23.3	52.2 ± 21.2	14.8%	.001
Blood	59.82 ± 13.4	42.3 ± 13.7	17.5%	.0001
Defences	67.48 ± 20.8	37.2 ± 18.2	30.3%	.0001
Inflammation	73.67 ± 19.3	59.7 ± 28.8	13.9%	.005
Respiration	46.29 ± 11.9	38.6 ± 21.9	7.7%	.139
Hormones	75.97 ± 17.7	55.4 ± 33.9	20.6%	.014
Renal	54.67 ± 15.0	38.0 ± 16.2	16.7%	.0002
Fluid & Electrolyte	72.59 ± 17.2	63.0 ± 20.2	9.6%	.062
Digestive	48.05 ± 22.4	45.4 ± 22.1	2.7%	.641
Reproductive	63.36 ± 16.7	46.9 ± 27.2	16.5%	.015

Results - cont'd

- Physiological knowledge retention was highest for the fluid and electrolyte balance, inflammation, hormones, and vascular physiology (63-52%). This was followed by the reproductive, digestive systems.
- Retention was significantly lower (P<0.001) for the respiratory, renal physiology, and defences (38-37% (Table 1).

Discussion

- These results demonstrate a high level of knowledge retention overall, with variations in retention being system-specific. The level of knowledge retention in this study was significantly higher than previous rates reported in medical and allied-health students (Pourshanazari et al., 2013), and is significantly higher than anatomical knowledge retention levels in the same population (Narnaware and Neumeier, 2020b).
- The base-level knowledge acquisition in ten physiological systems is significantly lower than anatomical knowledge acquisition (Narnaware and Neumeier, 2020b).
- These differences in organ system-specific knowledge retention may be attributed to the level of difficulty of the questions, the time period between time learned and time tested, students' perceived usefulness of the information, and bioscience subject-specific. Future studies could investigate the variables that impact specific system knowledge retention and the interventions that might improve those retention levels.

Conclusion

- In conclusion, physiological knowledge retention varied by body's organ system. The overall loss of 15.0% is consistent with results reported in medical and allied health professional students (Pourshanazari et al., 2013). This loss is higher than short-term (4-months) knowledge retention reported for the same population (Narnaware et al., 2020a).
- Physiological knowledge retention in this study is significantly higher than anatomical knowledge retention reported in second-year nursing students recently (Narnaware and Neumeier, 2020b).

Conclusion - cont'd

- While the loss is consistent with other disciplines, it does raise the concern of how much physiological knowledge is retained by students throughout their program and by registered nurses once they enter practice.
- Studies are currently underway to evaluate physiological knowledge retention in third-year 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.

Acknowledgement

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