The health of humans, animals, and the environment are inextricably connected. Throughout history the association between human health, animal health, and environmental health has been perceptible, vital, and interrelated. According to the Centers for Disease Control and Prevention (CDC), 60% of new and emerging diseases are zoonotic, or contagious from animals to people. Humans continue to coexist with several types of animals such as pets, food animals, and wildlife. Preserving and cultivating these relationships can be beneficial to each species, supporting and promoting each other’s health and welfare.
One Health is the collaborative effort of human, veterinary, and environmental medicine on a local, national, and global level, promoting the health of people, flora, and fauna. This concept is not new but has gained attention in recent years due to outbreaks of diseases such as COVID-19, West Nile virus, and Ebola. Global events such as climate change, natural disasters, and pollution that affect people, animals, and the environment have simultaneously served to emphasize the utility of One Health.

One Health is a multidisciplinary concept relying on the cooperation of professions from different fields. Supported by the CDC and World Health Organization (WHO), this initiative encourages medical, veterinary, and environmental professionals around the world to work together to improve global health outcomes, as well as increase knowledge and awareness of the One Health initiative. Interprofessional collaboration provides opportunities for professions with similar but different disciplines to share their expertise and increase One Health initiatives.

WORKING TOGETHER: HUMAN NURSES AND VETERINARY NURSES

All members of medical and veterinary healthcare teams are responsible for the health and wellbeing of their patients. Since One Health concerns such as zoonotic disease and environmental harm can affect both humans and animals concurrently, a collaborative approach at all levels of medical and veterinary care can be mutually beneficial. Veterinary health professionals focus on animal patients, which includes the health and welfare of pets and wildlife. For example, veterinary health professionals prioritize zoonotic disease according to animal-related conditions, whereas human health professionals prioritize zoonotic disease according to human-related conditions.

Medical and veterinary professionals may only choose to collaborate when there is a problem instead of maintaining an ongoing relationship. For example, an infectious zoonotic disease outbreak initially affecting animals may concern veterinary professionals but not elicit the same urgency for collaboration with human health professionals. However, once humans are affected, health professionals may desire to collaborate with veterinary professionals. This delay in interprofessional collaboration can impede care and treatment for animals and people alike.
Since human nurses are directly associated with patient care, learning about One Health can provide them with additional strategies to treat their patients at all levels of care, such as improving patient histories by including questions regarding pets, wildlife, or environmental exposures. When animals receive veterinary care, the risk of zoonotic disease and injury is reduced, since veterinary medicine is responsible for both human and veterinary public health through the control and management of zoonotic disease. Increasing and supporting One Health knowledge acquisition can benefit both nurses and veterinary nurses—but for this to happen, there must be integration into the respective training curricula. While this can be addressed for the next wave of veterinary nurses, how do we increase awareness of the profession and share the One Health knowledge of veterinary nurses already in practice? If physicians and veterinarians are able to engage in interprofessional collaboration, why not nurses and veterinary nurses?

Nurses and veterinary nurses have pride in their professions, which has led to disagreements regarding skills, roles, and job titles. Nurses and veterinary nurses do not typically work together; therefore they are unaware of each other’s education, responsibilities, and abilities. However, both professions benefit from advanced knowledge of One Health, and patients benefit from improved health outcomes. Increasing One Health knowledge through an online, interprofessional collaboration is a possible method to advance both fields of medicine as well as provide opportunities to share knowledge, which may otherwise be challenging to do.

**ORIGINAL RESEARCH: THE STUDY**

I recently completed my Doctoral Research Project (DRP) through A.T. Still University, creating a quantitative, experimental mixed analysis to evaluate the perception of an interprofessional, online One Health activity and evaluate One Health knowledge between nurses and veterinary nurses. The Institutional Review Board of Kirksville College of Osteopathic Medicine reviewed and approved this research study on September 4, 2019. The objectives for the first assessment of this study included evaluating the effects of the professional group (nurses and veterinary nurses), program group (control and intervention), and time period (before and after a collaborative activity), along with their interactions on the perception of interprofessional collaboration. The objectives for the second assessment of this study included evaluating the effects of the professional group, program group, and time period, along with their interactions on the measurement of One Health knowledge.

**TABLE 1 Changes over Time for Nurses and Veterinary Nurses in Interprofessional Collaboration Perception and Knowledge of One Health**

<table>
<thead>
<tr>
<th></th>
<th>NURSES</th>
<th>VETERINARY NURSES</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Pre-test M (SD)</td>
<td>Post-test M (SD)</td>
</tr>
<tr>
<td>Perception of Interprofessional Collaboration</td>
<td>75 (7.5)</td>
<td>79 (6.4)</td>
</tr>
<tr>
<td>Knowledge of One Health</td>
<td>8.3 (1.6)</td>
<td>8.7 (1.2)</td>
</tr>
</tbody>
</table>

M=Mean, SD=Standard Deviation. *p < 0.05

**TABLE 2 Comparison of Human Nurses’ Intervention and Control Groups for Post-Test Interprofessional Collaboration Perception and Knowledge of One Health**

<table>
<thead>
<tr>
<th></th>
<th>CONTROL GROUP M (SD)</th>
<th>INTERVENTION GROUP M (SD)</th>
<th>DIFFERENCE</th>
<th>95% CI FOR DIFFERENCE</th>
<th>COHEN’S D</th>
</tr>
</thead>
<tbody>
<tr>
<td>Perception of Interprofessional Collaboration</td>
<td>78 (4.8)</td>
<td>80 (7.5)</td>
<td>-2.2</td>
<td>[-10.8, 6.4]</td>
<td>0.35</td>
</tr>
<tr>
<td>Knowledge of One Health</td>
<td>8.2 (1.1)</td>
<td>9.0 (1.2)</td>
<td>-0.80</td>
<td>[-2.3, 0.68]</td>
<td>0.72</td>
</tr>
</tbody>
</table>

M=Mean, SD=Standard Deviation
The research questions were:
- What were nurses’ and veterinary nurses’ perceptions regarding interprofessional online distance activities before and after the collaboration?
- Was there a significant increase in knowledge regarding One Health, and did this differ between nurses and veterinary nurses in the control and intervention groups?

The sample population consisted of 12 registered nurses and 13 credentialed veterinary nurses, recruited through advertisements on social media (i.e., LinkedIn, Facebook, Twitter, and Instagram), an email advertisement from the Virginia Association of Licensed Veterinary Technicians, and peer requests. Participants were required to be employed or volunteering, have internet access, review and accept the informed consent, and complete both the pre-intervention and post-intervention assessments. These assessments included the Readiness for Interprofessional Learning Scale (RIPLS), adapted 2009 Latrobe Community Health version, and the One Health knowledge test I created. The participants engaged anonymously in an online One Health activity, including a One Health didactic presentation followed by a fictional case study presented in Google Classroom. Half of the participants were randomly assigned to a control group that did not have the benefit of collaboration and half of the participants were randomly assigned to an intervention group with an integrated collaboration component. Participants had 1 week to complete the assessments and activities.

THE RESULTS
An experimental mixed analysis design, specifically a 3-way mixed analysis of variance, was used to analyze the data for both research questions using IBM SPSS version 25. Paired t-tests were used for additional analyses of independent relationships. As hypothesized, results demonstrated that mean RIPLS and One Health Knowledge test scores increased or remained the same between time periods, with varying interaction effects between the professional groups and the program groups (TABLE 1). These scores indicate positive perceptions of interprofessional collaboration and a high level of One Health knowledge in both professions. Nurses in the intervention group had a positive perception of interprofessional collaboration which increased after participating in the intervention with concomitant increase in knowledge of One Health. Nurses in the control group initially...
demonstrated a positive perception of interprofessional collaboration, but this did not change across the study time period (TABLE 2). Veterinary nurses in both the control and intervention groups maintained a constant, favorable perception of interprofessional collaboration across the time period (TABLE 3). Although the 3-way interactions were not statistically significant, there were 2-way interactions between the professional group and the program group with moderate and large effects, warranting further investigation in future studies.

DISCUSSION
Study results aligned with the hypothesis that nurses and veterinary nurses would demonstrate a positive perception regarding interprofessional online distance activities before and after the collaboration intervention with both professions having high perception scores (80 for nurses, 78 for veterinary nurses). However, nurses experienced a higher increase between the pre-intervention and post-intervention assessment scores compared to veterinary nurses. Nurses have greater emphasis for interprofessional collaboration with other disciplines, as they work alongside a variety of other medical professionals. Veterinary nurses, on the other hand, have less experience with interprofessional collaboration due to assorted roles the veterinary nurse may have in various clinical settings and limited, hierarchal collaboration with the veterinarian. This aligns with previous research evaluating an interprofessional education workshop between nursing and veterinary nursing students. While there was positive interaction between the professions, there were still gaps in communication, confusion with roles, and a disconnect with the interprofessional collaborative experience, particularly with the veterinary nursing students.

Nurses experienced a greater overall level of positivity across both the control and intervention groups regarding interprofessional collaboration compared to nurses. In contrast, post-RIPLS assessment data indicate negligible change in positivity for the veterinary nurse control group and the veterinary nurse intervention group. Nurses and veterinary nurses started the study with a similar perception of interprofessional collaboration, but nurses finished with a higher level of positivity. This finding is mirrored in prior One Health interprofessional collaboration research between medical students and veterinary students in which medical students experienced greater positivity during collaborative exercises compared to veterinary students. This study’s findings also emphasized the value of increasing interprofessional regard of human medical professionals by exposing them to the training and expertise of veterinary professionals. Nurses appeared to not be as aware of the role and expertise of veterinary nurses, which could also explain the increased positivity at the end of the intervention. Similar sentiments were raised when medical students, unaware of the roles and expertise of veterinary students, expressed increased interest in the roles of veterinary students.

Study results partially supported the hypothesis that nurses and veterinary nurses would demonstrate an increase of knowledge of One Health, with the intervention group slightly outperforming the control group, as indicated by average scores over 8 out of 10. Nursing education includes public health, but One Health is a newer concept. Although a cornerstone of the veterinary profession is zoonotic disease prevention and public health awareness, veterinary nurses are exposed to One Health concepts through patient care and client education, rather than receiving formal training. Therefore, veterinary nurses may have been more confident in their One Health knowledge compared to nurses, and expected to score higher on the One Health knowledge test. However, the scores for both the nurses and veterinary nurses in the intervention group increased while the scores in the control group for both professions remained the same.

### TABLE 3 Comparison of Veterinary Nurses’ Intervention and Control Groups for Post-Test Interprofessional Collaboration Perception and Knowledge of One Health

<table>
<thead>
<tr>
<th></th>
<th>CONTROL GROUP M (SD)</th>
<th>INTERVENTION GROUP M (SD)</th>
<th>DIFFERENCE</th>
<th>95% CI FOR DIFFERENCE</th>
<th>COHEN’S D</th>
</tr>
</thead>
<tbody>
<tr>
<td>Perception of Interprofessional Collaboration</td>
<td>78 (6.6)</td>
<td>76 (5.9)</td>
<td>2.1</td>
<td>[-6.0, 10.1]</td>
<td>0.34</td>
</tr>
<tr>
<td>Knowledge of One Health</td>
<td>9.5 (0.6)</td>
<td>9.3 (0.7)</td>
<td>0.17</td>
<td>[-0.73, 1.1]</td>
<td>0.31</td>
</tr>
</tbody>
</table>

M=Mean, SD=Standard Deviation
Prior research shows that focused interventions can increase knowledge in other areas of medicine, such as prevention of nosocomial infections and One Health interprofessional education opportunities.17,20

LIMITATIONS, RECOMMENDATIONS, AND CONCLUSIONS
While the results of this study demonstrate a positive perception of an online, interprofessional One Health activity and collaboration between nurses and veterinary nurses, results should be interpreted with some caution. The initial recruiting method through social media did not yield the necessary sample size, and there were inconsistencies recruiting nurses and veterinary nurses through the secondary recruiting method, thus limiting the sample required for a robust analysis. Participants had a limited timeframe to complete the pre-intervention assessment, One Health Google Classroom activity, and post-intervention assessment. The limited time may have affected the attrition rate of participants, and reminder messages were limited to 2 for each process.

Additional research could increase opportunities for interprofessional collaborations as well as address gaps in One Health knowledge that were not identified in this study. For example, a qualitative study can be used to discover themes and provide greater clarification of the perception of interprofessional collaboration. This could triangulate the results of this study to determine the appeal of the perception of interprofessional collaboration between the 2 professions and receptivity to further training.

Future studies could be repeated with a longer interaction, larger sample size, and using a different online platform such as social media or a secure message board through a university. Offering the collaboration as continuing education could increase the appeal of participation, thus increasing the sample size. A different platform such as Facebook or a secure message board on a university site could accommodate larger groups, and a longer interaction could be supported with additional moderation assistance.

There is a need for accessible, interprofessional collaboration between all disciplines within the medical and veterinary communities, but particularly so for nurses and veterinary nurses due to their ongoing disagreements about the use of “nurse” to describe veterinary nurses/technicians. There is a dearth of...
Although nurses and veterinary nurses do not work in the same facility, the use of an online approach between these 2 professions can increase communication, foster new collaborations, and share One Health knowledge.

documented interactions between nurses and veterinary nurses, as evidenced by the lack of formal, peer-reviewed literature, which may be contributing to this professional dispute.

Although veterinary nurses maintained consistent perceptions of interprofessional collaboration, this study demonstrates the need to continue to provide opportunities for veterinary nurses to interact with nurses to share their knowledge and evaluate future interactions for increasing rapport with the nursing community. The use of Google Classroom provided a mutual environment for both professions to interact, regardless of geographic location, offering a unique opportunity to collaborate.

Both nurses and veterinary nurses in the intervention group increased their knowledge of One Health, while nurses and veterinary nurses in the control group maintained a consistent knowledge of One Health across the study. While the interprofessional collaboration may have increased One Health knowledge, future research is necessary to confirm these findings. However, these findings present a foundation that can be further expanded and investigated, and demonstrate a necessity to continue to share One Health knowledge between the 2 professions.

Nurses and veterinary nurses can learn from each other, work together, and participate in interprofessional collaborations. Although nurses and veterinary nurses do not work in the same facility, the use of an online approach between these 2 professions can increase communication, foster new collaborations, and share One Health knowledge.

Interprofessional collaborations between the nursing and veterinary communities can increase One Health knowledge and awareness among both professions as well as emphasize the similar roles for improving health outcomes for patients and the public. TVN

References

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