When the Virtual Becomes Reality: An Environmental Scan of the Presence of Virtual Reality and Artificial Intelligence in Health and Cancer Care Environments

Marcus Vaska (marcus.vaska@ahs.ca)

GL20, December 3-4, 2018

© Scanrail 123RF.com

Definitions: Artificial Intelligence & Virtual Reality

- **Artificial Intelligence**: “mimics elements of human cognition by computational means” [Rubak 2018]
- **Virtual Reality**: “a three-dimensional, computer-generated environment, which can be explored or interacted with by a person” [Virtual Reality Society 2017]

AI in Healthcare: A Brief History

- Tautology: “collaborative human-machine tasking improves performance over either alone” [Miller and Brown 2018]
- 1990s: first use of AI in medicine (electrocardiograms)
- The diagnostic speed and accuracy of AI in medical images parallels that of medical experts [BENEFIT]
- AI uses natural language processing when reading electronic medical records, being able to note any errors made by human bias[BENEFIT]
- “AI is neither astute nor intuitive [thus ensuring] physicians will remain essential to cognitive medical practice” [Miller and Brown 2018] [CHALLENGE]

VR in Cancer Care: A Brief Retrospective

- 1997: proposal launched to develop a more effective and less invasive colonoscopy [Wells, 2016]
- 2011: clinical trial conducted at the M.D. Anderson Cancer Center, University of Texas→virtual reality intervention in cancer genetics [M.D. Anderson Cancer Centre, 2011]
- 2016: 3-D virtual reality colonoscopy pioneered at the University of California, San Francisco [Wells, 2016]
- 2017: VR introduced in the Adolescent and Young Adult (AYA) cancer program at the University of Southern California (USC) Norris Comprehensive Cancer Center [Hu, 2017]

Two Environmental Scans

One Minute Question: Please provide the citations of any papers that you have ever encountered in your practice/research which discuss the use of virtual reality or artificial intelligence (either specifically in cancer or more generally in public health)

AI & VR in Cancer Care OR Health Care: Literature Search

Resources Consulted:

- MEDLINE (Ovid)
- PubMed
- CINAHL
- MEDLINE (Ebsco)
- Google Scholar

Limits Applied:

- English language
- 2007 – present

Terms Brainstormed:

artificial intelligence
virtual reality
machine learning
healthcare
public health
cancer
oncology
technology
2-D; 3-D

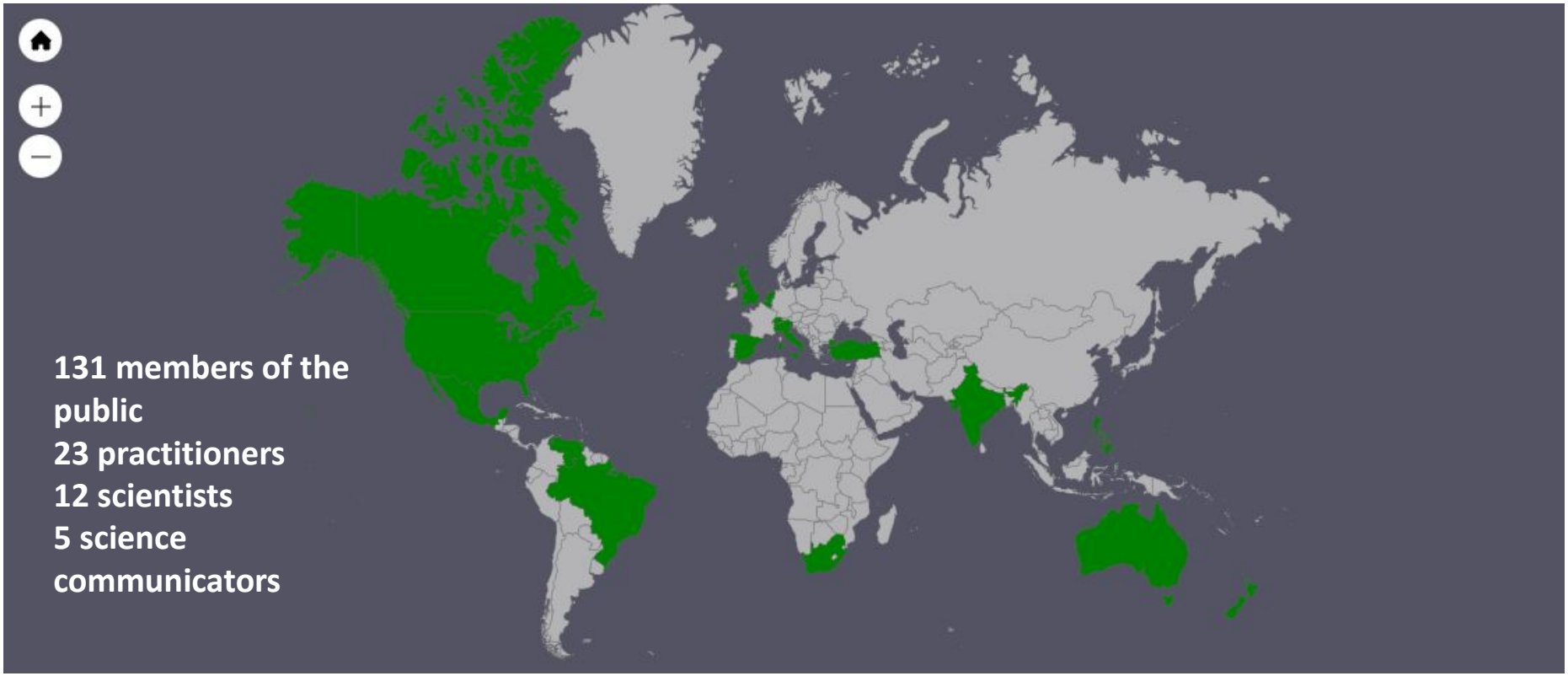
Environmental Scan Results

- Oncologists in the Calgary Zone
  - **12/110** responded, suggested **13** paper citations
- Literature Search on AI & VR in Cancer and Health
  - **39** papers identified
- Total Papers for Analysis: **52**
- Representative Sample→Altmetric Scores
  - **5** papers pertaining to **Healthcare (AI)**
  - **5** papers pertaining to **Cancer Care (VR)**
- Capture grey literature document types via social media:
  - Blogs
  - Facebook pages
  - News Outlets
  - Twitter feeds

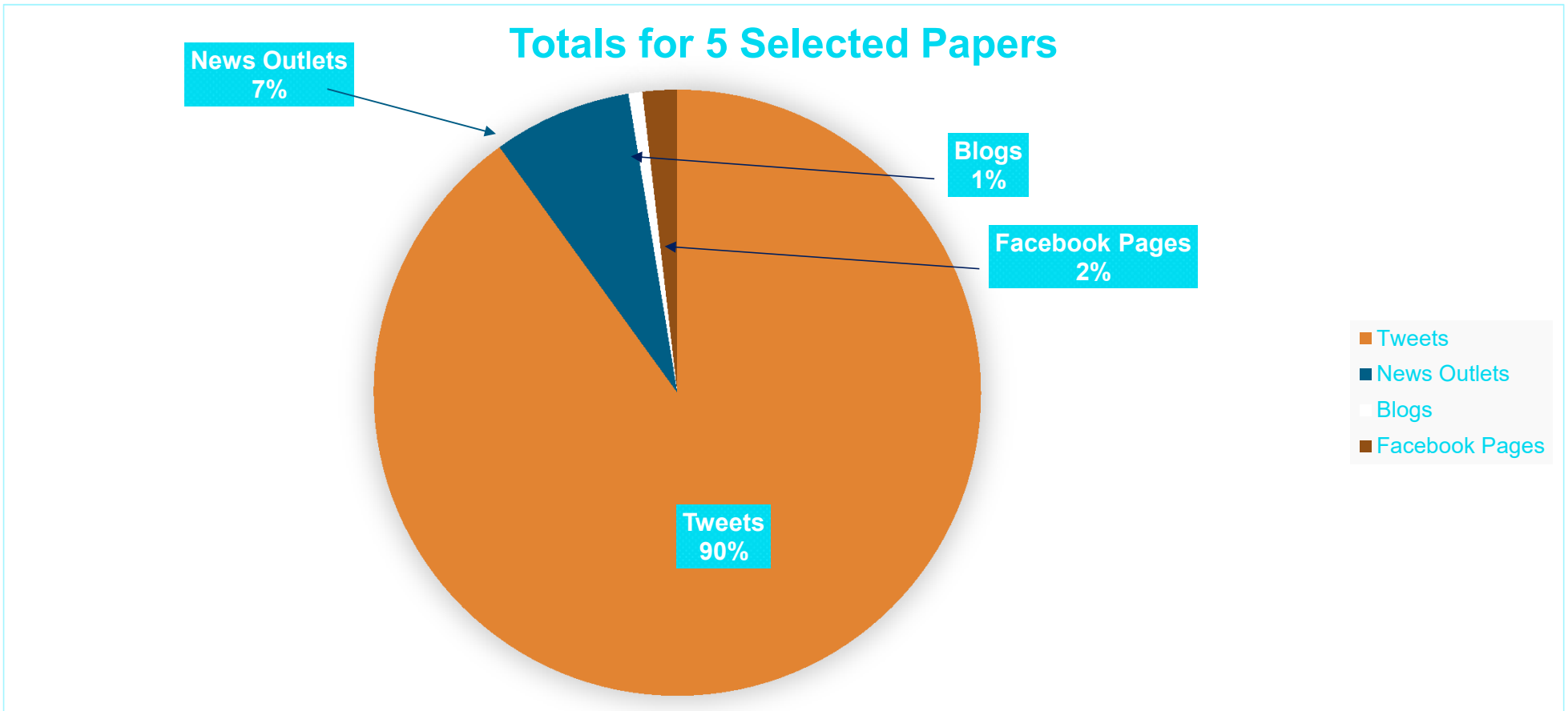
AI in Healthcare: 5 Selected Papers for Analysis

- Garret, B., Taverner, T., Masinde, W., Gromala, D., Shaw, C., & Negraeff, M. (2014). A rapid evidence assessment of immersive virtual reality as an adjunct therapy in acute pain management in clinical practice. *Clinical Journal of Pain, 30*(12): 1089-1098.
- Keller, M., Park, H., Cunningham, M., Fouladian, J., Chen, M., & Spiegel, B. (2017). Public perceptions regarding use of virtual reality in health care: a social media content analysis using Facebook. *Journal of Medical Internet Research, 19*(12): e419.
- Miller, D., & Brown, E. (2017). Artificial intelligence in medical practice: the question to the Answer? *American Journal of Medicine, 131*(2): 129-133.
- Wiederhold, B., Gao, K., Sulea, C., & Wiederhold, M. (2014). Virtual reality as a distraction technique in chronic pain patients. *CyberPsychology, Behavior, & Social Networking, 17*(6): 346-352.
- Wiederhold, B., Riva, G., & Gutierrez-Maldonado, J. (2016). Virtual reality in the assessment and treatment of weight-related disorders. *CyberPsychology, Behavior, & Social Networking, 19*(2): 67-73.

AI in Healthcare: Analysis & Discussion



AI in Healthcare – Grey Literature Document Types



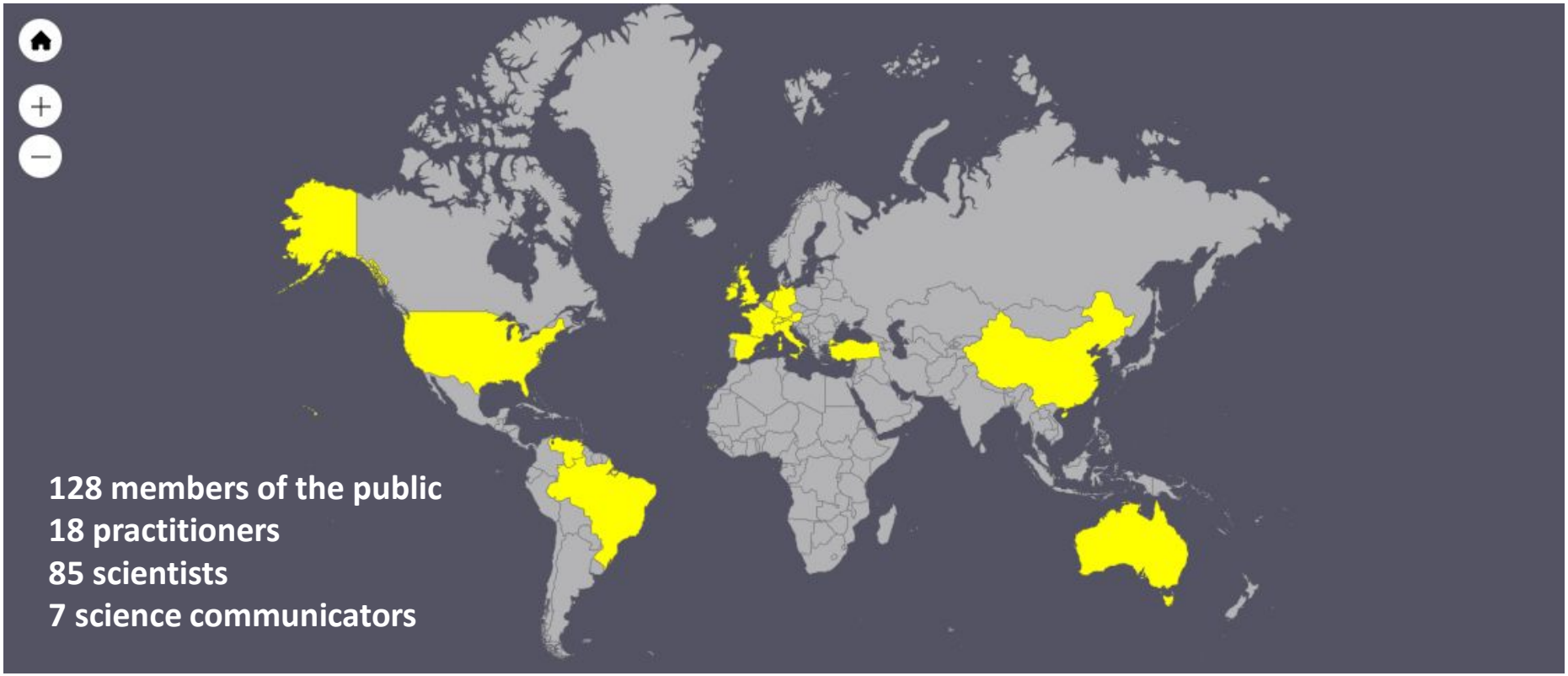
KRS@ahs.ca
KRS.albertahealthservices.ca

Alberta Health Services
Knowledge Management

VR in Cancer Care: 5 Selected Papers for Analysis

- Chirico. A., Lucidi, F., De Laurentis, M., Milanese, C., Napoli, A., & Giordano, A. (2015).Virtual reality in health system: beyond entertainment. A mini-review on the efficacy of VR during cancer treatment. *Journal of Cellular Physiology, 231*(2): 275-287.
- Hosny, A., Parmar, C., Quackenbush, J., Schwartz, L., & Aerts, H. (2018). Artificial intelligence in radiology. *Nature Reviews Cancer* [Epub ahead of print]
- Li, W., Chung, J., & Ho, E. (2011). The effectiveness of therapeutic play, using virtual reality computer games, in promoting the psychological well-being of children hospitalized with cancer. *Journal of Clinical Nursing, 20*(15-16): 2135-2143.
- Mobadersany, P., Yousefi, S., Amgad, M., Gutman, D., Barnholtz-Sloan, J., Velazquez, J., Brat, D., & Cooper, L. (2018). Predicting cancer outcomes from histology and genomics using convolutional networks. *Proceedings of the National Academy of Sciences of the United States of America, 115*(13): E2970-E2979.
- Schneider, S., & Hood, L. (2007). Virtual reality: a distraction intervention for chemotherapy. *Oncology Nursing Forum, 34*(1): 39-46.

VR in Cancer Care: Analysis & Discussion

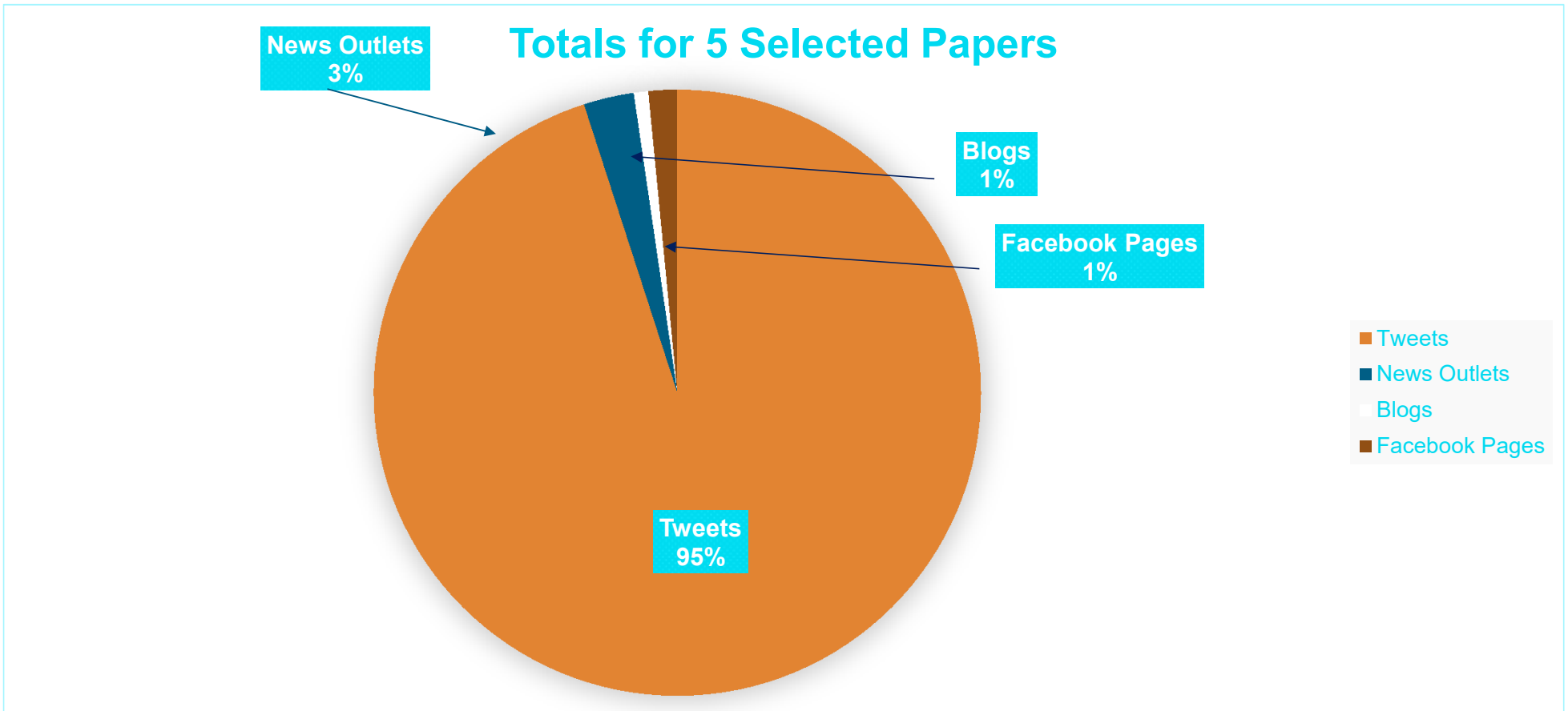


KRS@ahs.ca

KRS.albertahealthservices.ca

Alberta Health Services
Knowledge Management

VR in Cancer Care – Grey Literature Document Types



KRS@ahs.ca
KRS.albertahealthservices.ca

Alberta Health Services
Knowledge Management