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Tuning Learning Health Systems Up a NOTCH: Mixing Digital Methods for Social Media Communications

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Purpose/Objective(s): Oncology was founded on scientific inquiry. Data for our decision making has increased exponentially. However, behavior is not changing at scale. This stresses a need for smarter, faster, and more adaptive ways to develop, deliver, and improve on our education and information. With increasing emphasis on social media for health professionals, we describe a novel methodology to assess the value of Twitter for such health professional learning systems.

Materials/Methods: We conducted a comprehensive review of social media analytics for health professional learning on PubMed. We included articles within the last 5 years and excluded articles that did not focus on health professionals as the target of social media learning activities. Results were discussed with experienced individuals in education, data science, leadership, and systems engineering to develop a mixed-methods (MM) analysis approach applied to the August 2020 Radiation Oncology Twitter Journal Club (#RadOnc #JC).

Results: Findings from the review suggested social media metrics for learning activities were those easily extracted including use of unique hashtags, reporting tweets, comments, retweets, likes, participants, and followers, or calculated impressions. Metadata was used for common participant demographics including geography, discipline, and level. Polls were for planning future activities. Others were duration or number of activities, association (blog, podcast, society, or journal), or summaries. Feedback was measured through initial surveys. Overall, relevance to learning outcomes varied, attention to bias was limited, survey follow-up short, and content of tweets seldom captured. Recognizing a wealth of insights left ignored in the content of tweets, we developed a MM protocol adapting Qualitative Content Analysis (QCA) for Twitter. A tweet transcript was collected using healthcare analytics. A sample was segmented and iteratively sorted into categories through coding rules. Validation was performed through two iterations by three authors to a consensus threshold. The entire dataset was then analyzed. Final themes were based on their coded units and integrated with demographic data for further exploration using context from existing literature.

Conclusion: This MM protocol applied to social media learning activities can capture deeper insights on both how we learn for education and summarize our new collective knowledge for translation. This includes our novel use of online tools such as polls to better understand participant demographics and QCA adapted for social media. This can be streamlined through automation. Further validation through testing with other online activities and mechanisms for protocol quality improvement will allow its use to strengthen our learning health systems in radiation oncology more rapidly.

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Use of Retrospective Data for Comparative Effectiveness Research Yields Mixed Outcomes and Should be Avoided

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Purpose/Objective(s): In oncology, retrospective cohort studies are often used for comparative effectiveness research, studies that compare the efficacy of treatment A vs B. We examine the stability of these estimates using biostatistical methods for bias correction with varying sets of covariates. We hypothesize that retrospective comparative effectiveness research studies are sensitive to biostatistical analytic choices; by varying the methods, there will be significant instability and lack of consistency in conclusions.

Materials/Methods: We evaluated three disease sites in oncology where the addition of local therapy over systemic therapy alone has been hypothesized to improve survival in the metastatic setting: lung, prostate, and female breast, using multivariable Cox regression analyses. Patient data were extracted from the National Cancer Database, 2004-2014. We employed various statistical techniques to adjust for selection bias and immortal time bias, including propensity score matching, left truncation adjustment, and landmark analysis. Further, we used combinations of covariates in regression models to generate hazard ratios (HRs) with 95% confidence intervals. We constructed plots of $-\log10(P\text{-value})$ vs HR to quantify the variability of estimates.

Results: There were 72,549 lung, 14,904 prostate, and 13,857 female breast cancer patients included. We ran > 300,000 regression models, where each model represents a publishable study. Without propensity score matching or immortal time bias adjustment, all multivariable models provided HRs that favored the addition of local therapy for all cancers, with HRs < 1, and all P-values < 0.001. Once propensity score matching was added to our analysis, higher HRs were observed, but most were still < 1. When landmark analysis and covariate combinations were used, we generated HRs that were < 1, equal to 1, and > 1, with 100-fold differences in $-\log10(P\text{-values})$.

Conclusion: By altering the biostatistical approach with varying combinations of covariates, we were able to generate contrary outcomes and statistical significance. Our results suggest that some retrospective observational studies may find a treatment helps, and another may find it does not, simply based on analytic choices. This paradox highlights the importance of randomized controlled trials, and may explain the discordance noted in prior studies comparing observational trials and randomized studies.

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Unsealing the Source: Scope of Practice for Radiopharmaceuticals/Unsealed Sources Among U.S. Radiation Oncologists

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Purpose/Objective(s): To survey the utilization, interest in, and barriers to implementation of radiopharmaceuticals/unsealed sources amongst U.S. radiation oncologists.