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The academic tweet: Twitter as a tool to advance academic surgery

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A B S T R A C T

Social media, Twitter in particular, has emerged as an essential tool for surgeons. In the realm of academic surgery, it enables surgeons to advance the core values of academic surgery, as outlined by the Association for Academic Surgery: inclusion, leadership, innovation, scholarship, and mentorship. This article details the ways in which surgeons are using Twitter to embody these values and how the Twitter account for the Association of Academic Surgeons accomplishes its goal of inspiring and developing young academic surgeons.

Introduction

Just over a decade old, Twitter (San Francisco, CA, USA, URL: twitter.com) has emerged as a professional tool for surgeons, readily facilitating learning, networking, mentoring, research collaboration, and dissemination across the traditional barriers of geography, medical specialty, and seniority.[1] Apropos of the time constraints of practicing surgeons and surgical trainees, Twitter's character limit encourages concise messages allowing users to quickly discern whether they would like to join a discussion, further disseminate a message, or obtain more information (such as from an attached link). This article endeavors to outline the potential of Twitter to support academic surgeons through its ability to advance the core values of academic surgery, as outlined by the Association for Academic Surgery (AAS): inclusion, leadership, innovation, scholarship, and mentorship.[2]

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Inclusion

Academic surgery is a challenging career path, and prior studies have indicated increasing dissatisfaction among academic surgical faculty. Up to 21% of academic physicians have considered leaving academic medicine, citing reasons such as a "lower sense of inclusion, engagement, self-efficacy, values alignment, and institutional commitment to improve support for faculty."[3] There are indications that Twitter may mitigate factors that contribute to this.

Inclusion is central to the Twitter platform—anyone can open a Twitter account, and join the "conversation" at any time. It allows unlimited users to post simultaneously, discourages any one individual from dominating a conversation, and makes it nearly impossible to preempt others' participation. Naturally introverted personalities may overcome barriers to public discourse. In stark contrast to extensive curriculum vitae detailing publications, awards, and accomplishments, Twitter's short biographies force users to succinctly outline their core interests and passions.

Without the pretext of traditional academic surgical hierarchy, Twitter conversations often supersede social boundaries. Thus, Twitter provides a novel way for surgeons, trainees, medical students, and even premedical students to interact. Influence and message amplification gained through community participation and content, rather than seniority or social standing, may enhance innovation, inspiration, and morale, with some arguing that Twitter's elimination of the medical hierarchy leads to increased patient safety and improved outcomes.[1]

The emergence of surgery-specific hashtags, such as #SurgTweeting,[4] #ILookLikeASurgeon[5-7] and subspecialty hashtags such as #plasticsurgery[8] and #colorectalsurgery,[9,10] have created virtual communities engaged in conversation.[11] #SurgTweeting, one of the earliest surgical hashtags, has served as a community for both attendings and residents to interact and support each other in surgical life and research. #SurgParenting and other communities focus on life outside the operating room and allow surgeons a sense of personal camaraderie they may not feel in a purely professional setting.

Born out of female surgeons' frustration with surgical stereotypes, the #ILookLikeASurgeon hashtag grew from initially female participants to a gender-inclusive community celebrating diversity and promoting positive perceptions of surgeons.[6] The emphasis that #ILookLikeASurgeon places on gender equity and diversity holds particular relevance in academic surgery, where disparities in resource allocation, compensation, promotion, and advancement have resulted in a "leaky pipeline," resulting in the proportion of women in academic leadership positions failing to reflect the number of women in the field.[12]

Leadership

In 2011, Dr Kent Bottles presciently described Twitter as an "essential tool for the physician executive" in a blog post describing his ascent to "thought leader" on Twitter. His leadership in content curation (i.e., combing through health care articles and sharing those of interest with his followers) led to speaking and consulting jobs, as well as research contacts and interdisciplinary collaboration.[13] Surgeons on Twitter become respected voices with large followings not only based solely on their academic pedigree but also on the degree to which they share interesting content and participate in timely conversations.

One example of leadership facilitated by Twitter is the #hcldr (healthcare leader) tweetchat.[14] Started in 2012, this conversation convenes weekly to discuss a topic among a diverse community united by a passion for improving health care. The chat provides a unique opportunity for surgeons to interface with patients, physicians, nurses, CEOs, health information technologists, caregivers, policy makers, and students.[14] Other popular tweetchats include #MedEd (medical education),[15] #bcsm (breast cancer social media),[16,17] and #AWSchat (Association of Women Surgeons).[18] Regularly scheduled discussions that narrow the scope of the Twitter discourse for a brief period of time allow surgeons an influential voice in areas of expertise, as well as exposure to areas with which they may have limited engagement.

Surgical societies use Twitter accounts to expand their leadership influence beyond the confines of their geographic representation. For example, in 2015, the Royal Australasian College of Surgeons (RACS) commissioned a report on bullying, discrimination, and sexual harassment in surgery.[19] The final report was shared worldwide via social media and fostered a global discussion on the impact of harassment on medical education and the lives of practicing surgeons. By releasing the report via Twitter and other social media platforms, the RACS extended its reach and impact, positioning itself as a world leader regarding an issue faced by surgeons globally. RACS' established social media presence also afforded a swift response to negative press on the topic of surgical culture.

Innovation

Most advances in surgical science are the result of cross-disciplinary collaboration between surgeons and engineers, material scientists, and other nonclinicians. Twitter serves as a modern space where key stakeholders can meet and collaborate. Due to Twitter's international reach, discovering and connecting with collaborators is no longer limited by proximity or geography. Direct message Twitter chats allow for asynchronous or real-time conversations among two or more individuals to collaborate privately. With no more than a common interest, researchers can be connected, facilitating each other's work through virtual exchanges and collaborative writing efforts—such as the one leading to this article.

Similarly, Twitter-facilitated innovation allows collaborator coordination in trial recruitment and data synthesis, such as GlobalSurg, a global surgical outcome collaboration.[20-22] These collaborations have resulted in enhanced participant identification and recruitment, larger sample sizes, ahead-of-schedule study completion, and increased external validity. In the Student Audit and Research in Surgery (STARSurgUK), students coordinated data collection for multicenter studies, crediting their success to social media and internet-driven collaborator recruitment.[23,24] Similar collective networks have been established in South Africa and are proposed for sub-Saharan Africa[25] and Australia.[26]

Scholarship

With over 500 million daily tweets, Twitter serves as a rapidly growing data set that is ripe for "big data" analysis.[27] Twitter research techniques include content analysis,[28-30] public health surveillance,[31-35] qualitative analysis,[36,37] and network analysis.[38,39] The term "infodemiology" has been coined to refer to the "science of distribution and determinants of information with the ultimate aim to inform public health and public policy." Using Twitter for infodemiology research, Bosley *et al.*[40] analyzed the public discourse on cardiac arrest and resuscitation and found tweets on symptoms, risk factors, personal experiences, training, education, news media events, research articles, cardiac arrest/automated external defibrillator locations, fundraising opportunities, and conferences. Such information can be useful to inform public health messaging and improve delivery of care among other applications.

One of the greatest areas of impact of social media on academic surgery has been the dissemination of research.[41,42] Live tweeting of professional conferences is an increasingly popular way to promote the latest research findings and to establish connections for future investigations.[43-53] Savvy presenters use Twitter to amplify the reach of their conference posters, workshops, and presentation content, and it is now becoming popular for presenters to preplan tweets of key figures to coincide with their podium presentations at meetings. Postpublication tweeting of a visual abstract, a graphic representation of the study's methods and results, has been shown to increase article dissemination and readership.[54]

Academic journals have generally embraced social media with dedicated Twitter accounts publicizing recently accepted articles with author tags and electronic links, facilitating and accelerating global discussions on content leading to timely and rapid debate. Increasingly, the traditional academic performance scores of citations, impact factor, or H-index[55,56] are complemented by alternative metrics ("altmetrics") such as those by Altmetric (London, UK, URL: altmetric.com), ImpactStory (URL: impactstory.org), and Plum Analytics (URL: plumanalytics.com), which offer statistics on social media reach and dissemination, including page views, downloads, and mentions in media outlets, on blogs, and on Twitter.[57,58].

Blog posts have the potential to serve as a powerful adjunct to Twitter, explaining results and sharing the significance of surgical research in more depth with both the surgical community and general public. Highlighting the practice of blog posts as guideposts to journal articles, a study of Twitter citations of 28 academicians showed that 48% were "secondary citations," meaning there was an intermediary web page (typically a blog post or news article describing the study) between the tweet and the target resource.[41] To determine the impact of a corresponding blog post, Dixon *et al.*[59] wrote a blog post summarizing a PLoS One publication in radiology, including a link to the journal article. The blog post was promoted via Facebook and Twitter. In the 7 mo preceding the blog post, the PLoS ONE article received 3534 views. Within 7 d of blog publication, the article view count climbed by 3234 to 6768 (97% increase).[60]

Twitter additionally contributes to scientific excellence by providing a forum for both formal and informal postpublication peer review. Following the 2015 publication of a randomized controlled trial comparing appendectomy to antibiotics for the treatment of acute appendicitis, the #SurgTweeting world instantly took notice and turned to Twitter for discussion.[61] The resultant, robust dialog spawned its own hashtag (#AppyGate) and led to Behind the Knife: The Surgery Podcast, hosting its first live debate, with two surgeons active on Twitter discussing the pros and cons of the article.[62] The online discussion and debate did not occur at the behest of the original article's publisher but rather because surgeons read the article and sought a forum in which to discuss it. Physicians on Twitter not only increase their chances of expeditiously hearing about and reading the article but also benefit from the spontaneous, vigorous, global discourse unique to social media platforms like Twitter. Indeed, some proponents argue that the live, public review of medical literature using SoMe platforms (such as online journal clubs) may become a modern form of peer review.[63,64]

Mentorship

Mentorship is essential to the practice of surgery.[65] Yet in 2015, a study of 565 surgical trainees in the UK and Ireland revealed that fewer than half identified a mentor.[66] One barrier to successful mentorship can be the difficulty in locating mentors with whom to establish a personal connection. Twitter expands the pool for mentorship beyond one's geographic location, making it possible for trainees to have multiple mentors for the various realms of their professional and personal lives. These connections can prove beneficial not only for the mentee but also for the mentor, often in the form of "reverse mentoring," in which mentors learn about emerging technologies and skills from their mentees.[67-69] Once a mentoring relationship is established, dialog can be facilitated through a variety of social media tools, such as direct messaging on Twitter, Facebook, and video conferencing.

Attendance at society conferences has historically been the avenue for students, residents, and junior faculty to present and learn about current research, find extramural mentors, and foster research collaborations. Many surgeons are now accomplishing these tasks via Twitter and arrive at conferences with networks already in place and an eagerness to meet their Twitter network members in person. These virtual networks form organically out of shared interests recognized through tweet content, retweets, and replies. Although academic networks traditionally formed over the course of many mutually attended meetings, Twitter has the capacity to markedly accelerate this process.

Inspiring and developing young academic surgeons

Through its Twitter account, @AcademicSurgery, the AAS connects with its membership, potential members, and the general public asynchronously and in real time. Twitter users receive updates from and interact with AAS year-round through tweet announcements of career and educational opportunities, awards, research breakthroughs, member

accomplishments, tweet chats, and journal clubs. Feeling connected to one's surgical societies outside of the annual conference can be especially useful for residents with limited time and funding to travel during clinical years. The AAS effectively uses Twitter for its primary goal of "inspiring and developing young academic surgeons."

Conclusion

Academic surgery is a challenging career enjoyed by many. Twitter enables surgeons to join a global community of academic surgeons passionate about improving the art, science, and practice of surgery. These time-honored objectives are being carried forward in a novel fashion by social media. Science is not advanced in isolation but rather through the sharing and investigating of ideas. Today's surgeons are using Twitter to advance the values that form the core of surgical practice: inclusion, leadership, innovation, scholarship, and mentorship. Ultimately, this collaboration has the power to improve the care of our patients.

REFERENCES

1. Steele SR, Arshad S, Bush R, et al. Social media is a necessary component of surgery practice. *Surgery*. 2015;158:857–862.
2. Speer AL, Kao LS. The Association for Academic Surgery 2011-present: standing on the shoulders of giants. *J Surg Res*. 2017;217:20–24.
3. Satiani B, Williams TE, Brod H, Way DP, Ellison EC. A review of trends in attrition rates for surgical faculty: a case for a sustainable retention strategy to cope with demographic and economic realities. *J Am Coll Surg*. 2013;216:944–953. discussion 953–954.
4. Jones C. First #SurgTweeting tweet. @jonessurgery. Available at: https://twitter.com/jonessurgery/status/444266921165193216; 2014. Accessed February 13, 2018.
5. Logghe H. #ILookLikeASurgeon Tweet it. Own it. Allies for health. Available at: http://alliesforhealth.blogspot.com/2015/08/ilooklikeasurgeon-tweet-it-own-it.html; 2015. Accessed October 31, 2017.
6. Hughes KA. #ILookLikeASurgeon goes viral: how it happened. *Bull Am Coll Surg*. 2015;100:10–16.
7. Logghe HJ, Boeck MA, Atallah SB. Decoding Twitter: understanding the history, Instruments, and techniques for success. *Ann Surg*. 2016;264:904–908.
8. Branford OA, Kamali P, Rohrich RJ, et al. #PlasticSurgery. *Plast Reconstr Surg*. 2016;138:1354–1365.
9. Logghe HJ, Pellino G, Brady R, McCoubrey AS, Atallah S. How Twitter has connected the colorectal community. *Tech Coloproctol*. 2016;20:805–809.
10. Brady RRW, Chapman SJ, Atallah S, et al. #colorectalsurgery. *Br J Surg*. 2017;104:1470–1476.
11. Logghe HJ, McFadden CL, Tully NJ, Jones C. History of social media in surgery. *Clin Colon Rectal Surg*. 2017;30:233–239.
12. Sexton KW, Hocking KM, Wise E, et al. Women in academic surgery: the pipeline is busted. *J Surg Educ*. 2012;69:84–90.
13. Twitter: an essential tool for the physician executive|THCB. Available at: http://thehealthcareblog.com/blog/2011/01/25/twitter-an-essential-tool-for-the-physician-executive/; 2011. Accessed February 8, 2018.
14. About. hcldr. Available at: https://hcldr.wordpress.com/about/; 2012. Accessed February 8, 2018.
15. Madanick R. View all posts by Ryan Madanick MD→. Announcing the new #meded chat. Gut Check Blog https://gutcheckblog.com/2011/05/30/announcing-the-new-meded-chat/; 2011. Accessed February 8, 2018.
16. #BCSM-The Intersection Of Breast Cancer And Social Media. #BCSM. Available at: http://bcsm.org/. Accessed February 8, 2018.
17. Attai DJ, Cowher MS, Al-Hamadani M, Schoger JM, Staley AC, Landercasper J. Twitter social media is an effective tool for breast cancer patient education and support: patient-reported outcomes by survey. *J Med Internet Res*. 2015;17:e188.
18. #AWSchat-Healthcare Social Media Analytics and Transcripts. Symplur. Available at: https://www.symplur.com/healthcare-hashtags/awschat/; 2018. Accessed February 8, 2018.
19. Crebbin W, Campbell G, Hillis DA, Watters DA. Prevalence of bullying, discrimination and sexual harassment in surgery in Australasia. *ANZ J Surg*. 2015;85:905–909.
20. Bhangu A, Kolias AG, Pinkney T, Hall NJ, Fitzgerald JE. Surgical research collaboratives in the UK. *Lancet*. 2013;382:1091–1092.
21. Jamjoom AAB, Phan PNH, Hutchinson PJ, Kolias AG. Surgical trainee research collaboratives in the UK: an observational study of research activity and publication productivity. *BMJ Open*. 2016;6:e010374.
22. Shaw K. About GlobalSurg. Globalsurg. Available at: http://globalsurg.org/who-we-are/. Accessed February 10, 2018.
23. STARSurg - National student research collaborative network. STARSurg. Available at: https://starsurg.org/. Accessed February 8, 2018.
24. Khatri C, Chapman SJ, Glasbey J, et al. Social media and internet driven study recruitment: evaluating a new model for promoting collaborator engagement and participation. *PLoS One*. 2015;10:e0118899.
25. Spence RT, Panieri E, Rayne SL, Harrison EM, Bhangu AA, Fitzgerald JE. Collaboration is key to strengthening surgical research capacity in sub-Saharan Africa. *S Afr Med J*. 2016;106:125–126.
26. Manning TG, Christidis D, Zotov P, Lawrentschuk N. "Collaboration through communication": the Young Urology Researchers Organisation (YURO). *BJU Int*. 2016;118:6–7.
27. Sayce D. Number of tweets per day?|David Sayce. David Sayce. Available at: https://www.dsayce.com/social-media/tweets-day/; 2010. Accessed February 9, 2018.
28. Chew C, Eysenbach G. Pandemics in the age of Twitter: content analysis of Tweets during the 2009 H1N1 outbreak. *PLoS One*. 2010;5:e14118.
29. Sullivan SJ, Schneiders AG, Cheang C-W, et al. "What's happening?" A content analysis of concussion-related traffic on Twitter. *Br J Sports Med*. 2012;46:258–263.
30. Callcut RA, Moore S, Wakam G, Hubbard AE, Cohen MJ. Finding the signal in the noise: could social media be utilized for early hospital notification of multiple casualty events? *PLoS One*. 2017;12:e0186118.
31. Santillana M, Nguyen AT, Dredze M, Paul MJ, Nsoesie EO, Brownstein JS. Combining search, social media, and traditional data sources to improve Influenza surveillance. *PLoS Comput Biol*. 2015;11:e1004513.
32. Das M, Kim NJ. Using twitter to survey alcohol use in the san Francisco bay area. *Epidemiology*. 2015;26:e39–e40.
33. Eysenbach G. Infodemiology and infoveillance: framework for an emerging set of public health informatics methods to analyze search, communication and publication behavior on the Internet. *J Med Internet Res*. 2009;11:e11.
34. Kagashe I, Yan Z, Suheryani I. Enhancing seasonal Influenza surveillance: topic analysis of widely used medicinal drugs using twitter data. *J Med Internet Res*. 2017;19:e315.
35. Mowery J. Twitter Influenza surveillance: quantifying seasonal misdiagnosis patterns and their impact on surveillance estimates. *Online J Public Health Inform*. 2016;8:e198.

36. Rachel Henzell M, Margaret Knight A, Morgaine KC, Antoun JS, Farella M. A qualitative analysis of orthodontic-related posts on Twitter. *Angle Orthod*. 2014;84:203–207.
37. Lachmar EM, Wittenborn AK, Bogen KW, McCauley HL. #MyDepressionLooksLike: examining public discourse about depression on twitter. *JMIR Ment Health*. 2017;4:e43.
38. Hanson CL, Cannon B, Burton S, Giraud-Carrier C. An exploration of social circles and prescription drug abuse through twitter. *J Med Internet Res*. 2013;15:e189.
39. Hage AN, Chick JFB, Jeffers B, Srinivasa RN, Gemmete JJ, Srinivasa RN. #InterventionalRadiology. *J Vasc Interv Radiol*. 2018. https://doi.org/10.1016/j.jvir.2017.12.023 [Epub ahead of print].
40. Bosley JC, Zhao NW, Hill S, et al. Decoding twitter: surveillance and trends for cardiac arrest and resuscitation communication. *Resuscitation*. 2013;84:206–212.
41. Priem J, Light Costello K. How and why scholars cite on Twitter. *Proc Am Soc Info Sci Tech*. 2010;47:1–4.
42. Ogden LE. Tags, blogs, tweets: social media as science tool? *Bioscience*. 2013;63:148.
43. Cochran A, Kao LS, Gusani NJ, Suliburk JW, Nwomeh BC. Use of Twitter to document the 2013 academic surgical congress. *J Surg Res*. 2014;190:36–40.
44. Haas MRC, Huang R, Tomlinson S, Santen SA. #EMConf: utilising Twitter to increase dissemination of conference content. *Med Educ*. 2016;50:572.
45. Anderson G, Gleeson S, Rissel C, Wen LM, Bedford K. Twitter tweets and twaddle: twittering at AHPA. National Health Promotion Conference. *Health Promot J Austr*. 2014;25:143–146.
46. Awad NI, Cocchio C. Use of Twitter at a major national pharmacy conference. *Am J Health Syst Pharm*. 2015;72:65–69.
47. Hawkins CM, Duszak R, Rawson JV. Social media in radiology: early trends in Twitter microblogging at radiology's largest international meeting. *J Am Coll Radiol*. 2014;11:387–390.
48. Inglis SC, Newton PJ, Cripps PJS, Macdonald PS, Davidson PM. Social media: a tool to spread information: a case study analysis of Twitter conversation at the Cardiac Society of Australia & New Zealand 61st Annual Scientific Meeting 2013. *Collegian*. 2014;21:89–93.
49. McKendrick DRA, Cumming GP, Lee AJ. Increased use of Twitter at a medical conference: a report and a review of the educational opportunities. *J Med Internet Res*. 2012;14:e176.
50. Nason GJ, O'Kelly F, Bouchier-Hayes D, Quinlan DM, Manecksha RP. Twitter expands the reach and engagement of a national scientific meeting: the Irish Society of Urology. *Ir J Med Sci*. 2015;184:685–689.
51. Canvasser NE, Ramo C, Morgan TM, Zheng K, Hollenbeck BK, Ghani KR. The use of social media in endourology: an analysis of the 2013 World Congress of Endourology meeting. *J Endourol*. 2015;29:615–620.
52. Mishori R, Levy B, Donvan B. Twitter use at a family medicine conference: analyzing #STFM13. *Fam Med*. 2014;46:608–614.
53. Jalali A, Sherbino J, Frank J, Sutherland S. Social media and medical education: exploring the potential of Twitter as a learning tool. *Int Rev Psychiatry*. 2015;27:140–146.
54. Ibrahim AM, Lillemoe KD, Klingensmith ME, Dimick JB. Visual abstracts to disseminate research on social media: a prospective, case-control crossover study. *Ann Surg*. 2017;266:e46–e48.
55. Hirsch JE. An index to quantify an individual's scientific research output. *Proc Natl Acad Sci U S A*. 2005;102:16569–16572.
56. Garfield E. The history and meaning of the journal impact factor. *JAMA*. 2006;295:90–93.
57. Brigham TJ. An introduction to altmetrics. *Med Ref Serv Q*. 2014;33:438–447.
58. Trueger NS, Thoma B, Hsu CH, Sullivan D, Peters L, Lin M. The altmetric score: a new measure for article-level dissemination and impact. *Ann Emerg Med*. 2015;66:549–553.
59. Dixon A. New "tell-tail" MRI sign of Parkinson's disease|Radiology blog post|Radiopaedia.org. Radiopaedia. Available at: https://radiopaedia.org/blog/new-tell-tail-mri-sign-of-parkinsons-disease-1. Accessed February 13, 2018.
60. Hoang JK, McCall J, Dixon AF, Fitzgerald RT, Gaillard F. Using social media to share your radiology research: how effective is a blog post? *J Am Coll Radiol*. 2015;12:760–765.
61. Salminen P, Paajanen H, Rautio T, et al. Antibiotic therapy vs appendectomy for treatment of uncomplicated acute appendicitis: the APPAC randomized clinical trial. *JAMA*. 2015;313:2340–2348.
62. Martin AWM. Appendicitis a surgical disease? The debate. Behind the Knife. Available at: http://www.behindtheknife.org/podcast/appendicitis-a-surgical-disease-the-debate/; 2015. Accessed February 9, 2018.
63. Faulkes Z. The vacuum shouts back: postpublication peer review on social media. *Neuron*. 2014;82:258–260.
64. Galbraith DW. Redrawing the frontiers in the age of post-publication review. *Front Genet*. 2015;6:198.
65. Assael LA. Every surgeon needs mentors: a Halsteadian/Socratic model in the modern age. *J Oral Maxillofac Surg*. 2010;68:1217–1218.
66. Sinclair P, Fitzgerald JEF, Hornby ST, Shalhoub J. Mentorship in surgical training: current status and a needs assessment for future mentoring programs in surgery. *World J Surg*. 2015;39:303–313. discussion 314.
67. Rombeau JL, Goldberg A, Loveland-Jones C. *Surgical Mentoring: Building Tomorrow's Leaders*. New York: Springer Science & Business Media; 2010:172.
68. Luks HJ. Is healthcare ripe for reverse Mentors? - howard Luks, MD. Howard J. Luks, MD. Available at: https://www.howardluksmd.com/medical-social-media/healthcare-reverse-mentors/; 2012. Accessed February 8, 2018.
69. *Complexities in Colorectal Surgery: Decision-Making and Management*. 1st ed. New York: Springer-Verlag; 2014.