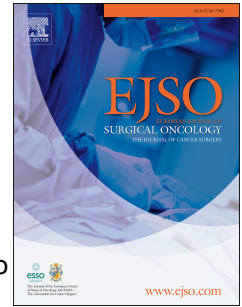


# Accepted Manuscript

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Original article

**Tweeting the meeting: quantitative and qualitative Twitter activity during the 38<sup>th</sup> ESSO conference**

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**Conflict of interests:** KS is member of Education & Training Committee of ESSO; KP is immediate past chair of EYSAC; LL is current chair of EYSAC; HM is editorial assistant to the EJSO.

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**Key words:** Twitter; Social media; conference; education; surgical research; surgical oncology

**Abstract**

**INTRODUCTION:** Social media is increasingly used to share information with the potential for fast and wide reach. Data on use during surgical oncology conferences is limited. We aimed to monitor twitter usage during a surgical oncology conference to audit impact of activity.

**METHODS:** A prospective, time-restricted, observational study of twitter activity using the #ESSO38 hashtag in the week before and during the 38<sup>th</sup> ESSO conference (10-12 October, 2018; Budapest, Hungary). Data on individual tweets and retweets, including date and tweeter or retweeter were collected using NodeXL, FollowTheHashtag, Twitonomy and TAGS.

**RESULTS:** The study period (10-13 October) documented 328 tweets by 58 tweeters with 1,167 retweets, with a soaring activity and mentions during the conference days, with a potential reach at over 7.5 million. The nodal network of tweets, the most active tweeters and retweeters are presented as well as the most frequently used hashtags. The top 3 hashtags used were #ESSO38, #SoMe4Surgery# and #EYSAC. A positive influence on the @ESSOweb twitter handle was noted, with the numbers of followers growing from 1.5K to over 1.8K representing a 20% growth in just over a week.

**CONCLUSIONS:** Activity on tweeter during the conference was considerable, with a potential for a wide reach beyond those attending the conference. A more structured approach to the use of twitter for future conferences may enhance experience, activity and reach.

## Introduction

Social media has become an integral part of medical education and communication and is viewed as an essential part of modern oncological practice and research(1). The value of social media to surgical research is increasingly documented(2), with networks and growing communities finding their place in surgical specialties. While social media and, particular, twitter use, has gained momentum in surgical specialties such as plastic surgery(3) and colorectal surgery(4), it seems to be less documented on other fields of surgery. In surgical oncology, the use is not widespread, with only one of three journals having a unique twitter handle and using visual abstracts as a way of disseminating research on twitter(5). Twitter use during conference meetings is less well documented, although most meetings now use social media to enhance conference output and value(6, 7). Evaluation of previous national surgical meetings(7), or subspecialty specific conferences(8) have shown an exponential increase in use of social media and effect on impressions over time. However, little is known of social media activity at surgical oncology conferences, and in particular related to the ESSO conference.

Thus, the aim of this study was to investigate the quantitative and qualitative twitter use of the prespecified conference hashtag #ESSO38 and monitor the use of tweets and impressions before and during the meeting.

## Methods

### *Ethics*

No ethics were perceived necessary for the study as it did not interfere with any patient or human data beyond measuring internet activity among twitter users.

### *Design*

A prospective, time-restricted, observational study of twitter activity using the #ESSO38 hashtag in the week before and during the 38<sup>th</sup> ESSO conference (10-12 October, 2018; Budapest, Hungary). All tweets were counted, irrespective of coming from attendees or external parties.

In order to gauge the development, engagement and activity of the #ESSO38, the twitter activity was followed the week before and then during the conference days. In the week before the conference started, occasional tweets were sent to encourage attendees and followers on twitter to engage with the hashtag #ESSO38.

The sitting chair of the EYSAC (European Young Surgeons and Alumni Club) was informed of the planned use of the hashtag. Twitter use of the hashtag #ESSO38 for delegates was incentivised via a tweet from the @ESSOweb twitter handle that was launched the weekend before the conference to encourage active use of the hashtag during the conference, with a price draw for the most frequent user (free registration to next years conference #ESSO39, Rotterdam, Netherlands).

On the starting day of the conference, an EYSAC symposium on new technologies in surgical research was held, with a lecture on “Social media in surgical research. Visual abstracts, Altmetrics and more”(5), where the active use and involvement of the attendees was further encouraged to the audience. Starter slides and/or conference break slides advertised the hashtag #ESSO38 to make the audience aware and encourage usage and spread.

### *Monitoring of activity*

One of the authors (G.M.) was instructed of the hashtag to be used a week prior to the conference and prepared to follow activity through available programs.

While social network analysis provides a useful way of exploring interactions between tweeters, there are important limitations, and some of the metrics are poorly defined (9). There are, however, methods for extracting raw data from the outputs of these social network tools, and this information can be used in a transparent and reproducible way (10).

Data on individual tweets and retweets, including date and tweeter or retweeter were collected using NodeXL (Social Media Research Foundation; California, USA; <https://www.smrfoundation.org/nodexl/>), Followthehashtag (<https://www.followthehashtag.com>), Twitonomy (<https://www.twitonomy.com>) and TAGS (<https://tags.hawksey.info>). The period of analysis was narrowed to 6.05AM on 5 October to 6.06AM on 15 October because data were available for this period for each of the tools. As NodeXL also records individual mentions of tweeters this tool was used for the rest of the analysis.

## Results

During the days before and over the 3 conference days, the tweets using the hashtag #ESSO38 generated a potential reach of >7.5 million. The timeframe of the activity and its network activity is shown in **Figure 1** with a peak incidence of tweets during the conference. The global activity had an expected predominant European activity but also activity in other continents, including North America and Australasia (**Figure 2**).

The outputs of the different social media analytical tools are compared in **table 1**, and for top tweeters and retweeters in **table 2**. The analysis shows comparable results between the tools, but only NodeXL identified 335 tweets, the number identified from a simple manual count of tweets from a Twitter search. Though NodeXL also records retweet data in tweets the figure used in the analysis is higher than the figure based on individual retweets stated in **table 1**.

The main analysis based on a NodeXL extract (11) documented 328 tweets by 58 tweeters with 1,167 retweets between 27 September and 12 October. Top tweets from ESSO38 are listed in a Wakelet summary (<https://wakelet.com/wake/b37a91ac-bce5-4437-95ad-dac387141b24>), produced on 13 October 2018. The top tweets included comprehensive coverage of the conference, including plenary, parallel and poster sessions.

Overall, 13 (22%) of tweeters received 80% of retweets while 8 (14%) tweeters received no retweets. The top 20 tweeters by number of retweets are shown in **Table 2**. The number of Twitter accounts tweeting, retweeting and mentioned (in original tweets only) is listed in **Figure 3**. The two biggest categories were accounts that just retweeted (ie did not post original tweets), and accounts that were mentioned by other tweeters, but did not tweet or retweet themselves. A relatively small group of tweeters tweeted, retweeted and were mentioned by other users (n=19), but of these 17 tweeters contributed 96/109 tweets to the summary. The remaining 9 tweeters included in the summary either just tweeted (n=4), tweeted and were mentioned (n=2), or tweeted and retweeted (n=3). Knowing that a wider group of tweeters were engaged with the conference tweeting, but their tweets were not shared widely as measured by number of retweets, helps understand the potential audience for a future conference.

The most frequently used hashtags in tweets are depicted in **Table 3**. The most popular hashtags include general hashtags such as #SoMe4Surgery and #SurgicalResearch, and topic specific hashtags (e.g. #breastcancer, #breastsurgery, #colorectalsurgery, #gastricsurgery).

The social media activity had positive influence on the @ESSOweb twitter handle, with the numbers of followers growing from 1.5K (October 2<sup>nd</sup>, 2018) to over 1.8K (October 13<sup>th</sup>, 2018, representing a 20% growth in just over a week.

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## Discussion

This is the first attempt to monitor social media activity and reach during an ESSO conference. The activity was good when measured in number of active conference tweets measured in the hundreds, with a number of individuals composing the central core of activity. The reach was considerable, with potential impressions in the millions and activity followed outside of the European continent during the conference. "Impressions" – the number of potential views of tweets – is crudely estimated using most social media tools, simply multiplying number of tweets by number of followers for each individual tweeter; nonetheless, the estimates can be compared with other conferences.

The data gives some insight into the nature and use of social media among surgical oncologists and the potential reach of conference content to attendees and outside conference attendance. The use of social media to enhance conference value is increasing, but only a handful of reports are available to document the use (6-8, 12, 13), of which a few pertain to surgical oncology or surgery per se (6-8). Some larger surgical organizations, such as the American College of Surgeons, now hosts specific social media sessions during their conferences, with the idea of sharing and promoting material during conference session. An analysis of breast surgeons' twitter use during a conference(8) found an impressive increase in activity, with the number of impressions going from about 3 million to over 20 million within a few years, presenting an enormous opportunity for sharing information. Further, previous experience from American Society of Clinical Oncology (ASCO) conference has demonstrated both an increase in use and evolution in focus of Twitter activity reviewed over a 5-year period (ASCO 2011 to 2016). The number of individual tweeters increased from 1,429 to 15,796, representing an 11-fold increase over the 5-years period (14). Furthermore, a remarkable 9-fold increase in number of tweets occurred during the 5-year period (from 7,746 to 72,698 tweets). The most commonly tweeted term or topic changed over time, generally reflecting the breakthroughs of each designated year. For example, terms were "melanoma" for both the 2011 and 2012 ASCO meetings; "breast cancer" for the 2013 ASCO meeting; "lung cancer" for the 2014 ASCO meeting; and "ImmunOnc" or "immunotherapy/immunoncology" for both the 2015 and 2016 ASCO meetings(14).

Some limitations need to be mentioned to the current report. One is the that the data here relies on any tweeter or user actually using the #ESSO38 hashtag to allow for capture of data. With the wealth of information that is posted by the minute on social media it can be a daunting task to keep track of what is posted. The hashtag (#), which denotes a specific category or topic, helps in streamlining this wealth of information. However, most likely,

many have tweeted on conference material without using the #ESSO38 or by using other # that was not captured by the metrics presented here. Thus, the mentioned numbers may represent a minimum capture of data, and the actual activity may be considered both higher and the reach wider in reality. One positive addition to the individual activity is the noted activity to related organizational twitter accounts, including Lancet Oncology (@LancetOncol) and BowelCancerIntelligence UK (@bci\_uk) who may be viewed as social influencers in cancer care. Another caveat is that there are currently no one standard metrics from which to obtain a true twitter activity and across all measured outcomes. Thus, there is currently a need to capture activity across several available platforms, with some inconsistency and potential for missing data between each and one of them. However, by obtaining metrics across several platforms we believe we have presented the most central outcome data to reflect the social media activity during the conference. Social media data can be used in planning, monitoring and summarising health conferences, but analysis requires time, patience and checking for missing data (15).

Based on the data captured for the 38<sup>th</sup> ESSO conference, there may be value in a more preplanned and active use of specific hashtags in addition to conference hashtag (such as #ESSO39 for the upcoming Rotterdam conference in 2019) in the future. For example, “tracks” such as #colorectalcancer, #breastcancer, #pancreaticcancer, #CRLM (colorectal liver metastasis) #HIPEC or #PIPAC may draw attention to more content specific lectures and discussions on social media during a conference and hence draw attention to a more specific audience(16). Notably, the spread of ideas and information based on new data or trials may be enhanced by drawing attention to the audience outside the conference. While this will not preclude the value of attending the conference, it may surely gain attraction from those prevented to participate personally at a conference.

Further, one may consider a more active use of speakers’ and attendees’ twitter handle, e.g. encourage attendees to submit their twitter handle on registration; use of twitter handle on name badge (now being done at some conferences, e.g. as done at the American College of Gastroenterologists conference in 2018); include QR codes on name badges and, possibly have speakers include their twitter handle on the introductory slide of their talk to encourage engagement during and beyond a specific session. Obviously, such engagement should be voluntarily for active participation, to not suggest a mandatory request for those who would opt out of social media activity for any reason. It should also be possible to simply ‘lurk’ (that is, passively follow and read without actively posting or retweeting tweets) during

conference Twitter activity. The same sort of activity may be encouraged for poster presenters (e.g. opportunity to share poster on twitter for wider audience).

Notably, sharing content on social media has some implications. One may be the breach of intellectual property and copyrights, e.g. sharing data considered for later publication. However, for most science work exposure is rather deemed favourable(17), unless content is shared to such an extent that it may jeopardize later publication. More likely, information shared through 140 (or, 280 signs) or a slide image may be taken out of context, may be prone to false interpretation or cited in the wrong setting. One has to keep in mind that social media is not peer-reviewed nor curated, and, thus, liable to some types of negative influences. Not all may be willing to share their slides, preliminary data or outcomes on social media (18), thus a policy of steps forward with opportunities and considerations to threats may be useful to issue for users. Useful steps and tips from other stakeholders are already available and should be implemented in a structured fashion(1). This activity may be brought forward by the conference committee, the EYSAC group and the ESSO body at large for optimal promotion and benefit to the surgical oncology community.

## References

1. Sedrak MS, Attai DJ, George K, Katz MS, Markham MJ. Integrating Social Media in Modern Oncology Practice and Research. American Society of Clinical Oncology educational book American Society of Clinical Oncology Annual Meeting. 2018(38):894-902.
2. Mayol J, Dziakova J. Value of social media in advancing surgical research. The British journal of surgery. 2017;104(13):1753-5.
3. Branford OA, Kamali P, Rohrich RJ, Song DH, Mallucci P, Liu DZ, et al. #PlasticSurgery. Plastic and reconstructive surgery. 2016;138(6):1354-65.
4. Brady RRW, Chapman SJ, Atallah S, Chand M, Mayol J, Lacy AM, et al. #colorectalsurgery. The British journal of surgery. 2017;104(11):1470-6.
5. Søreide K. Numbers needed to tweet: social media and impact on surgery. Eur J Surg Oncol. 2018;in press.
6. Cochran A, Kao LS, Gusani NJ, Suliburk JW, Nwomeh BC. Use of Twitter to document the 2013 Academic Surgical Congress. The Journal of surgical research. 2014;190(1):36-40.
7. Segura Sampedro JJ, Morales Soriano R, Ramos Rodriguez JL, Gonzalez-Argente FJ, Mayol J. Twitter((R)) use and its implications in Spanish Association of Surgeons meetings and congresses. Cirugia espanola. 2018;96(6):352-6.
8. Attai DJ, Radford DM, Cowher MS. Tweeting the Meeting: Twitter Use at The American Society of Breast Surgeons Annual Meeting 2013-2016. Annals of surgical oncology. 2016;23(10):3418-22.
9. ScotPublicHealthblog. Social network analysis: quirks, pitfalls and biases [Available from: <https://scotpublichealth.com/2018/01/19/social-network-analysis-quirks-pitfalls-and-biases/>].
10. ScotPublicHealthblog. How to run social media for a health conference: planning, tweeting and summarising. [Available from: . <https://scotpublichealth.com/2018/01/30/how-to-run-social-media-for-a-health-conference-planning-tweeting-and-summarising/>].
11. NodeXL. NodeXL extract of #ESSO38 tweets, 5-15 October 2018 [Available from: <https://nodexlgraphgallery.org/Pages/Graph.aspx?graphID=171438>].
12. Desai T, Shariff A, Shariff A, Kats M, Fang X, Christiano C, et al. Tweeting the meeting: an in-depth analysis of Twitter activity at Kidney Week 2011. PloS one. 2012;7(7):e40253.
13. Udovicich C, Barberi A, Perera K. Tweeting the meeting: A comparative analysis of an Australian emergency medicine conference over four years. Journal of emergencies, trauma, and shock. 2016;9(1):28-31.
14. Pemmaraju N, Thompson MA, Mesa RA, Desai T. Analysis of the Use and Impact of Twitter During American Society of Clinical Oncology Annual Meetings From 2011 to 2016: Focus on Advanced Metrics and User Trends. Journal of oncology practice. 2017;13(7):e623-e31.
15. ScotPublicHealthblog. Monitoring health related activity on Twitter: Tips for individuals, organisations, campaigns and conference organisers. [Available from: <https://scotpublichealth.com/2018/03/13/handing-over-the-reins-crowdsourcing-twitter-data-on-health-campaigns/>].

16. Pemmaraju N, Thompson MA, Qazilbash M. Disease-specific hashtags and the creation of Twitter medical communities in hematology and oncology. *Seminars in hematology*. 2017;54(4):189-92.
17. Pemmaraju N, Mesa RA, Majhail NS, Thompson MA. The use and impact of Twitter at medical conferences: Best practices and Twitter etiquette. *Seminars in hematology*. 2017;54(4):184-8.
18. Light D, Pawlak M, de Beaux A, Brady RR. Is sharing speaker's slides from conference presentations on social media a breach of intellectual property or a delegate's right? Depends who you ask. *International journal of surgery (London, England)*. 2018;58:22-5.

**Table 1: Comparison of number of tweets, tweeters, retweets and retweeters recorded by four different social media analytical tools.**

	Tweets	Tweeters	RTs	Retweeters
NodeXL	335	58*	1,150	234
TAGS	324	57	1,161	235
Followthehashtag	323	59*	1,070	232
Twitonomy	321	57	1,161	235

\* Difference, comparing FTH and NodeXL outputs is a locked account

RT, denotes retweets

**Table 2. The top 20 tweeters, ranked by number of retweets received.**

<b>Tweeter</b>	<b>RTs received</b>	<b>Tweets posted</b>	<b>% of RTs received</b>	<b>Cum % of RTs received</b>	<b>Followers</b>	<b>Ranking by RTs received</b>	<b>Mentions</b>
polom_karol	225	71	19.3%	19.3%	370	1	19
ksoreide	135	33	11.6%	30.8%	1,097	2	22
gmacscotland	94	21	8.1%	38.9%	11,963	3	5
dr_mohammadyami	79	11	6.8%	45.7%	1,384	4	10
ymasannat	74	28	6.3%	52.0%	20,751	5	9
sarkwatt	70	10	6.0%	58.0%	187	6	7
oliviawriting	51	12	4.4%	62.4%	118	7	9
lauralorenzonmd	48	12	4.1%	66.5%	506	8	13
olofssonbagge	37	10	3.2%	69.7%	129	9	2
ernst_katrin	31	5	2.7%	72.3%	37	10	1
helenmohan1	30	3	2.6%	74.9%	1,118	11	4
thelancetoncol	24	3	2.1%	76.9%	19,492	12	5
bci_uk	19	20	1.6%	78.6%	143	13	1
essonews	18	2	1.5%	80.1%	1,579	14	60
fabienreyal	17	5	1.5%	81.6%	492	15	1
lillianreza	16	5	1.4%	82.9%	55	16	
stephaniemwong	15	3	1.3%	84.2%	50	17	
itrisabel	15	5	1.3%	85.5%	67	18	6
darioparini	14	2	1.2%	86.7%	180	19	
carmela_surgery	14	2	1.2%	87.9%	104	20	

The number of times these tweeters were mentioned and/or retweeted are also shown. Source: NodeXL.

**Table 3. Top 10 hashtags used during the 38<sup>th</sup> ESSO conference**

<b>Hashtag #</b>	<b>No. of tweets (n)</b>
ESSO38	328
SoMe4Surgery	59
eyzac	41
surgicalresearch	29
breastcancer	14
breastsurgery	12
ESSO39	11
colorectalsurgery	11
hipec	10
gastriccancer	10

Source: NodeXL 27 September to 12 October 2018



**Figure legends****Figure 1. Timeline of activity and network on Twitter during 38<sup>th</sup> ESSO.**

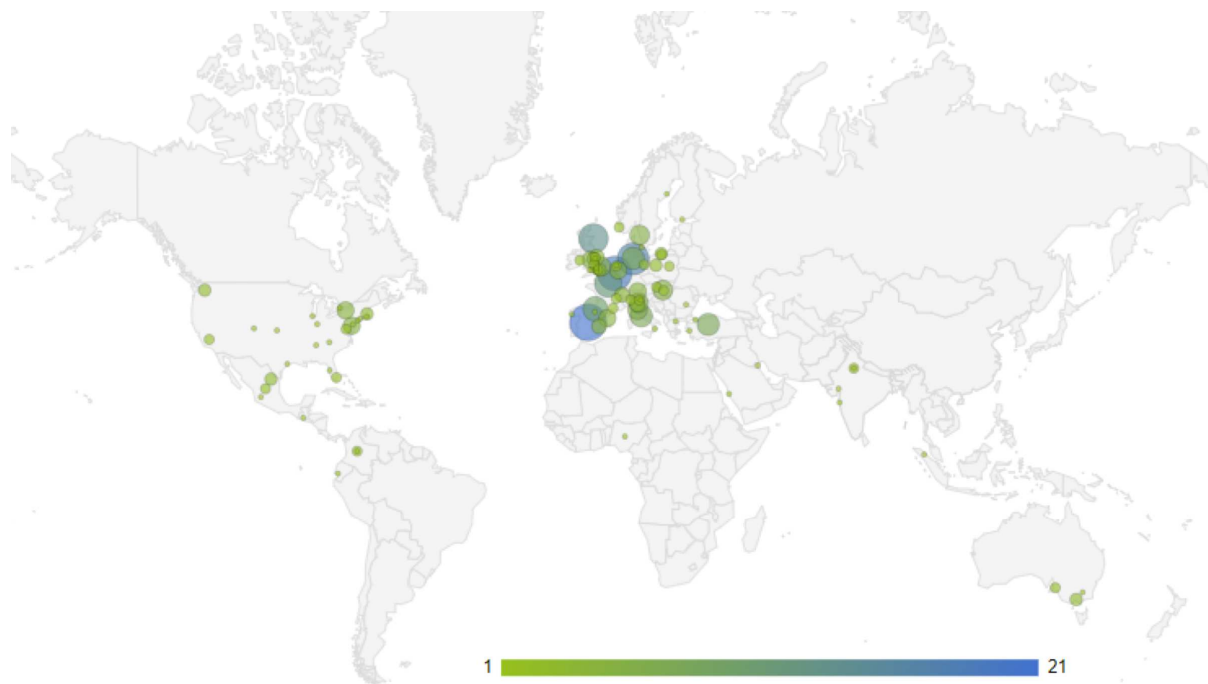
Legend:

- A. Timeline of activity related to conference dates (data from Twitonomy).
- B. NodeXL map showing interaction and network of Twitter activity during conference

**Figure 2. Global map of Twitter activity during the conference.****Figure 3. Tweeters posting, retweeting, or mentioned in tweets using the #ESSO38 hashtag**

Legend: Tweeters, retweeters and Twitter accounts mentioned in #ESSO38 tweets, 27 September to 12 October 2018, source NodeXL. N=328 tweeters

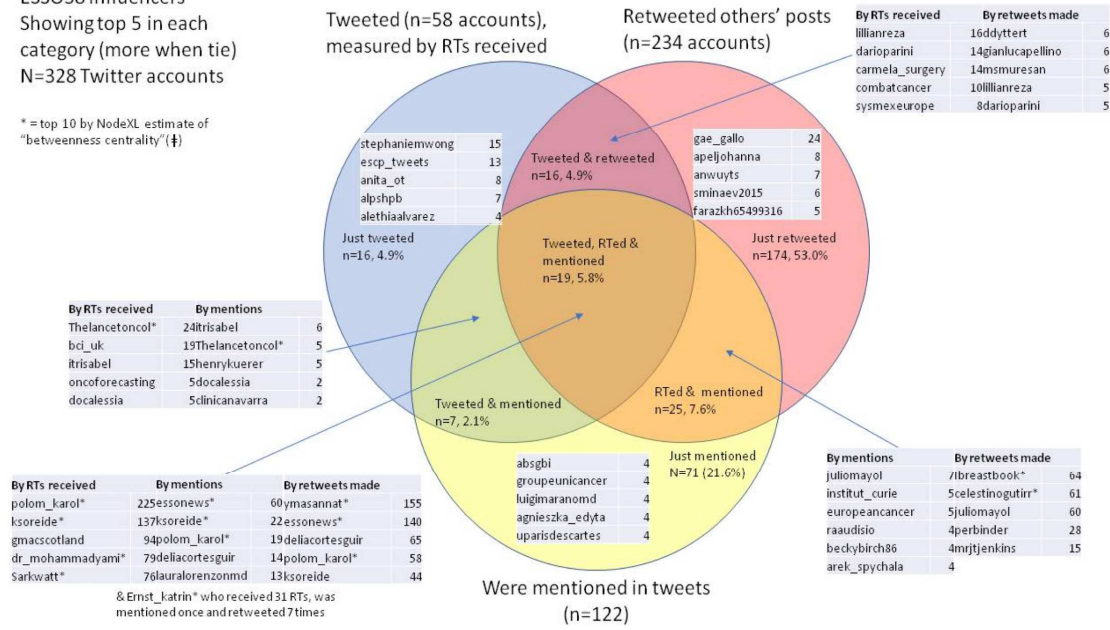




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ESSO38 influencers  
Showing top 5 in each  
category (more when tie)  
N=328 Twitter accounts

\* = top 10 by NodeXL estimate of  
"betweenness centrality" (†)



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**Conflicts of interest**

KS is member of Education & Training Committee of ESSO; KP is immediate past chair of EYSAC; LL is current chair of EYSAC; HM is editorial assistant to the EJSO.

**Funding**

None

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