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The effect of social media (#SoMe) on journal impact factor and parental awareness in paediatric urology

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Summary

Background
Social media (SoMe) comprises a number of internet-based applications that have the capability to disseminate multimodal media and allow for unprecedented inter-user connectivity. The role of Twitter has been studied in conferences and education; moreover, there is increasing evidence that patients are more likely to use social media for their own health education.

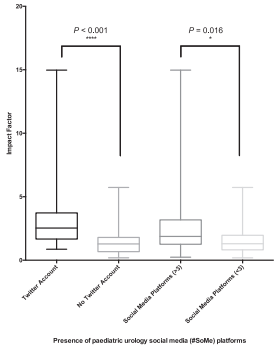
Objective
The aim of this study was to assess the impact of social media platforms on the impact factor of both urological and paediatric journals that publish on paediatric urology, and to assess parental awareness of social media in paediatric urology.

Study design
A filtered Journal of Citation Reports (JCR) search was performed for the period 2012–16 for journals that published articles on paediatric urology. Journals were ranked according to impact factor, and each individual journal website was accessed to assess for the presence of social media. Parents in paediatric urology clinics and non-paediatric urology patients also filled out a questionnaire to assess for awareness and attitudes to social media. All statistical analysis was performed using Prism 6 software (Prism 6, GraphPad Software, California, USA).

Results
Overall, there were 50 urological journals and 39 paediatric journals with a mean impact factor of 2.303 and 1.766, respectively. There was an overall average increase in impact factor across all urological journals between 2012 and 16. The presence of a Twitter feed was statistically significant for a rise in impact factor over the 4 years ($P = 0.017$). The cohort of parents was statistically more likely to have completed post-secondary education, to have and access to a social media profile, use it for health education, and use it to access journal/physician/hospital social media accounts.

Discussion
This study examined, for the first time, the role of social media in paediatric urology, and demonstrated that SoMe use is associated with a positive influence in impact factor, but also a parental appetite for it. Limitations included a non-externally validated questionnaire. There may also have been bias in larger journals that generate and maintain social media platforms such as Twitter, which may then in turn have an influence on impact factor.

Conclusions
Social media use within paediatric urology was associated with a higher impact factor, which remained significant after 4 years of analysis. Parents were more likely to use a wide variety of social media to search for conditions and physicians/healthcare providers; therefore, journals and institutions need to embrace and endorse SoMe as a potential source of important clinical information.



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Introduction

Social media comprises a number of internet-based applications that enable unprecedented inter-user connectivity. There have been a number of programs, which have increased in popularity over the last number of years, such as Facebook™ and Twitter™, amongst others, which now represent an estimated 1.13 and 0.313 billion daily users, respectively [1,2]. Of these platforms, Twitter has been the most widely researched. Nason et al. highlighted the emerging use of Twitter by urological journals, and showed that the adoption of Twitter was associated with a higher journal impact factor, and could be used to highlight significant articles to readers [3].

There have been a number of studies examining the impact and global reach of Twitter in urological conferences. At the European Association of Urology (EAU) annual meeting in 2014 (#EAU14), there were 5749 Tweets from 761 contributors, and 10,364 Tweets from 1199 contributors at the American Urological Association (AUA) meeting (#AUA14) [4]. In 2016, this rose to 13,428 Tweets from 1387 contributors at #EAU16, and 15,593 Tweets from 2243 contributors at #AUA16 (www.symplur.com). The nature of conference Tweets has also changed over time, with a 12% increase in informative Tweets [5]. Borgmann et al. analysed Tweet content at the EAU annual meeting in 2013, and demonstrated that most Tweets (88%) occurred during conference hours, with an average of 24.7 Tweets/hour [6]. Twitter has also expanded into a monthly urology journal club meeting (#urojc), which generates an average of 189 contributors across 19 countries with >130,000 impressions/month [7].

In a study by Loeb et al. across AUA members, 74% of respondents (6.95% overall) had an online social media account. The most commonly used social media platforms were Facebook (93%), LinkedIn (46%), Twitter (36%) and Google+ (26%). Being aged <40 years was an important predictor of social media use (83 vs 56%), with greater uptake among residents/fellows compared with attendance (86 vs 66%); 28% of respondents used social media for professional purposes [8]. Subsequently, Fuoco et al. demonstrated amongst CUA members (45% overall response) that the roles of social media in healthcare included interprofessional communication (67%) or as an information repository (59%), and that online patient interaction was endorsed by 14% of urologists. In all, 94.6% agreed the need to exercise caution in personal posting, and 57% felt medical regulatory bodies should 'stay out of personal social media activities', especially those in practice <10 years. A total of 73% felt that online interaction with patients would become inevitable in the future [9].

Patients have also become more willing in recent years to search online for information pertaining to specific conditions [10]. The Pew Research Internet Project (n = 3001) reported that 72% patients now search online for health conditions [11]. Patients also have access to online video content (e.g. YouTube) to inform them about conditions/surgeries [12]. Nason et al. reported during online searches for hydrocoeles, that 56.7% of patients accessed the Internet regarding their condition and 33% believed this information accurate [13].

The aim of this study was to assess the impact of social media platforms on the impact factor of both urological and paediatric journals that publish on paediatric urology, and to assess parental awareness of social media in paediatric urology.

Methods

A literature review (Medline/Pubmed/Web of Science) was performed with search terms "social media" and "paediatric urology". Following this, a search of the Journal of Citation Reports (JCR) for 2016, 2014 and 2012 was searched using "Andrology", "Paediatrics", Transplantation", "Urology" and "Nephrology" as the journal filters [14]. Journals were ranked according to impact factor, and followed over a 4-year period (2012–16). Urological journals that did not routinely publish paediatric papers, and similarly paediatric journals that did not publish urological papers, were selected and excluded. Only journals published in English were included (accessed August 2016).

Each journal's website was accessed to assess for the presence of social media accounts, specifically Twitter, Facebook, LinkedIn, YouTube, Google+, and the link to a Rich Site Summary (RSS) feed. Twitter accounts were then crosschecked to ensure that accounts were present, and the date of establishment was recorded. For journals without Twitter profiles, it was recorded whether their corresponding association or society had a Twitter profile (e.g. European Urology and EAU). Impact factor kinetics and presence of social media platforms were then analysed.

To assess parental awareness of social media, patients and parents (in the case of a minor) were invited to participate across two sites (one adult clinic, one paediatric clinic) in a voluntary, non-clinical, anonymous survey regarding their attitudes toward and use of social media. Participants completed a 10-item questionnaire designed by the authors to assess demographic information, general internet use, and preferences regarding social media platforms. Usage was quantified as daily, >3 times/week, <3 times/week, and a post-hoc analysis was employed.

Statistical analysis was conducted using Fisher's contingency tables and Pearson correlations. Multiple regression analysis was performed to examine the effects of platform number and individual SoMe outlets on journal impact factor. All statistical analysis was performed using SPSS (IBM, USA) and Prism 6 software (Prism 6, GraphPad Software, California, USA). Institutional Review Board approval was not required.

Results

A literature review for social media in paediatric urology yielded zero relevant results on PubMed/Medline. The Journal Citation reports search initially yielded 225 journals; however, when the above criteria were applied, this was reduced to 101 journals, and subsequently to 89 journals after those that were not in continuous publication (2012–2016) were excluded [14].

Table 1 Top 12 core surgical and paediatric journals publishing paediatric urology, listed in descending order by impact factor (Courtesy of Journal Citation Report 2016).

Surgical journal titles	Impact factor (2016)	Change in impact factor (2014–16)
European Urology	14.976	+1.038
Nature Reviews Urology	5.957	+1.117
Journal of Urology	4.7	+0.34
BJU International	4.387	+0.854
World Journal of Urology	2.397	−0.269
Urology	2.187	−0.001
Journal of Endourology	2.107	+0.399
Journal of Paediatric Surgery	1.733	+0.346
Paediatric Transplantation	1.284	−0.157
European Journal of Paediatric Surgery	1.269	+0.275
Journal of Paediatric Urology	1.17	+0.272
Paediatric Surgery International	1.01	+0.015
Paediatric journal titles	**Impact factor (2016)**	**Change in impact factor (2014–16)**
Archives of Pediatrics & Adolescent Medicine	5.731	0
Pediatrics	5.196	−0.277
Journal of Pediatrics	4.122	+0.332
Archives of Disease in Childhood - Fetal and Neonatal Edition	3.969	+0.849
Journal of Adolescent Health	3.838	+0.226
Archives of Disease in Childhood	3.231	+0.332
Paediatric Research	2.761	+0.447
Academic Paediatrics	2.438	+0.431
Paediatric Clinics of North America	2.424	+0.304
Current Opinion in Paediatrics	2.202	−0.326
BMC Paediatrics	1.813	−0.117
European Journal of Paediatrics	1.791	−0.099

The top 12 urological and paediatric journals had an impact factor ranging 1.01–14.976 (Table 1). Overall, there were 50 urological journals and 39 paediatric journals with a mean impact factor of 2.303 and 1.766, respectively. Urological journals had a higher mean number of social media platforms, with 2.9 compared with 2.795 in paediatric journals, and higher rates of Twitter, Facebook, LinkedIn and YouTube availability. There was an overall average increase in impact factor of 0.445 across all the urological journals between 2012 and 16, compared with an average decrease of 0.192 across paediatric journals ($P = 0.003$) (Table 2).

There was a significant difference in the numbers of social media platforms available in those journals with an impact factor >2 ($P = 0.012$). On cross-analysis, those journals offering more than three social media outlets had a statistically significantly higher impact factor (IF 2.5 vs 1.53; $P = 0.017$). Of these platforms, the presence of a Twitter account between 2014 and 16 was associated with an increase in impact factor (0.155 ± 0.068), compared with a decrease in impact factor in the absence of a Twitter account (0.021 ± 0.041; $P = 0.022$). Those journals that started with an impact factor >2 were also not more likely to exhibit a consistent rise in impact factor over the 4 years ($P = 0.063$). Facebook was not associated with increasing journal impact factor ($P = 0.797$); however, journals with a Twitter feed had a significant rise in impact factor over the 4 years ($P = 0.017$). Of the 19 journals that demonstrated a consistent rise in impact factor, all were urological ($P < 0.001$) (Table 3).

There were 253 questionnaire responses (100% response rate): 119 responses were from the parents of children (children's hospital), and 134 responses were directly from patients (adult hospital). Questionnaires were anonymous, and took a mean of 27.4 ± 9.6 s to complete. There was a significant difference in age ranges across the two sites with adult patients (mean 55.18 years) compared with the parents of the paediatric patients (mean 34.33 years; $P < 0.001$). The paediatric hospital cohort was also statistically more likely to have completed post-secondary education (77.31%; $P = 0.037$), and to have a social media profile (95.8%; $P < 0.001$). The types of social media accounts accessed by each cohort can be seen in Table 4, with Facebook representing the most common form of social media at nearly 100% usage. There was a significant difference in usage of LinkedIn ($P < 0.001$), Pinterest (0.02), Twitter (0.004) and Google Plus ($P < 0.001$) in favour of the parent cohort. There was no significant difference in the use of YouTube between both cohorts. Parents attending the paediatric clinic were significantly more likely to access their social media accounts daily (55.26 vs 27.85%; $P < 0.001$), use them to learn more about a medical condition (96.64 vs 70.15%; $P < 0.001$), and also to access medical journals/organisations on social media relating to a condition (90.76 vs 54.48%; $P < 0.001$). A total of 85.71% children's parents said that they would access a physician's page/Twitter feed compared with 44.03% adult hospital respondents ($P < 0.001$), and the majority of patients would access their physician's social media platform in order to obtain information about the physician (range 72–86%), information about the hospital/organisation (range 76–80%), and out of curiosity (range 94–100%). A minority of respondents would use social media to connect with other patients (range 8–26%). Parents of the paediatric cohort also felt it more important for physicians/medical organisations and medical journals to exhibit a social media presence than the adult hospital cohort (92.44 vs 65.67%; $P < 0.001$).

Discussion

The present study highlights differences between urological and paediatric journals with respect to the adoption of

Table 2 Overall presence of social media platforms in urology and paediatric journals publishing paediatric urology articles.

	n	Mean ± SEM	Range	*P*-value
Overall impact factor				
Urology	50	2.303 ± 0.323	0.215–14.976	
Paediatrics	39	1.766 ± 0.204	0.194–5.196	0.192
Total SoMe platforms				
Urology	50	2.900 ± 0.227	0–6	
Paediatrics	39	2.795 ± 0.241	1–6	0.754
Overall average change in impact factor				
Urology	(+) 0.445	0.223 ± 0.071	(−) 1.419–5.445	
Paediatrics	(−) 0.192	(−) 0.096 ± 0.035	(−) 0.759–0.868	0.003

SoMe platform	Journal uptake	
	n	%
Twitter		
Urology	24	48
Paediatrics	15	38.46
Facebook		
Urology	29	58
Paediatrics	21	53.85
LinkedIn		
Urology	19	38
Paediatrics	11	28.21
YouTube		
Urology	9	18
Paediatrics	3	7.69
Google Plus		
Urology	16	32
Paediatrics	20	51.28
RSS		
Urology	48	96
Paediatrics	39	100

n, number; SEM, standard error of the mean; SoMe, social media; RSS, rich site summary.

Table 3 Overall presence of social media platforms in urology and paediatric journals publishing paediatric urology articles.

	n	Mean ± SEM	*P*-value
Social media platforms			
Journal impact factor >2	55	2.465 ± 0.297	
Journal impact factor <2	42	1.495 ± 0.380	0.012
Journal impact factor			
≥3 SoMe platforms	49	2.500 ± 10.320	
<3 SoMe platforms	40	1.537 ± 0.195	0.017
Presence of Twitter and change in impact factor			
Twitter account present (2014–16)	39	0.155 ± 0.068	
Twitter account absent (2014–16)	50	(−) 0.021 ± 0.0410	0.022

Consecutive increases in journal impact factor	*n*	β	%	*P*-value
≥3 SoMe platforms (2012–16)	10		20.41	
<3 SoMe platforms (2012–16)	9	0.080	22.22	1
Journal impact factor >2 (2012–16)	11		32.35	
Journal impact factor <2 (2012–16)	8	0.283	14.55	0.063
Twitter account present (2012–16)	13		34.21	
Twitter account absent (2012–16)	6	0.313	11.76	0.017
Facebook account present (2012–16)	10		20	
Facebook account absent (2012–16)	9	0.145	23.08	0.797
Urological journals	19		100	
Paediatric journal	0		0	<0.001

'Consecutive Increases' represented an increase with each subsequent year measured. *n*, number; β, Beta value; SEM, standard error of the mean; SoMe, social media.

Table 4 Demographics of patients' and parents' usage, knowledge and awareness of social media.

	Paediatric hospital (n = 119)		Adult hospital (n = 134)		P-value
	n	%	n	%	
Age, years					
30–40	97	81.51	17	12.69	<0.001
40–50	17	14.29	35	26.12	
50–60	5	4.20	27	20.15	
>60	0	0.00	55	41.04	
Education (highest level completed)					
Primary	4	3.36	5	3.73	0.037
2nd Level	23	19.33	47	35.07	
3rd Level	92	77.31	82	61.19	
Do you have a social media account?					
Yes	114	95.80	79	58.96	<0.001
No	5	4.20	65	41.04	
Which social media account type do you use? (multiple answers allowed)					
Facebook	112	98.25	77	97.47	
LinkedIn	86	75.44	37	46.84	<0.001
Pinterest	31	27.19	10	12.66	0.019
YouTube	54	47.37	28	35.44	0.106
Twitter	62	54.39	26	32.91	0.003
Google plus	35	30.70	11	13.92	<0.001
Myspace	8	7.02	3	3.80	
Other	3	2.63	0	0.00	
If you have a social media account, how often do you access it?					
Daily	63	55.26	22	27.85	<0.001
>3 times/week	38	33.33	32	40.50	
<3 times/week	13	11.40	25	31.65	
Would you use social media to learn more about your (child's) condition?					
Yes	115	96.64	94	70.15	<0.001
No	4	3.36	40	29.85	
Would you access medical journals/organisations on social media that were relevant to your (child's) condition?					
Yes	108	90.76	73	54.48	<0.001
No	11	9.24	61	45.52	
If your physician had a Facebook page/Twitter account, would you visit it?					
Yes	102	85.71	59	44.03	<0.001
No	17	14.29	75	55.97	
For what general purpose would you access your physician's social media account? (multiple answers allowed)					
Obtain information about the physician	74	72.55	51	86.44	
Gather information about the hospital/organisation	82	80.39	45	76.27	
Connect with other patients	27	26.47	5	8.47	
Curiosity	100	100	56	94.92	
Do you feel it is important for physicians/medical organisations/medical journals to have a social media presence?					
Yes	110	92.44	88	65.67	<0.001
No	9	7.56	46	34.33	

social media. Despite no initial overall difference in impact factor or total number of social media platforms being provided by urological or paediatric journals, there were consistently higher rates of SoMe usage by urological journals in contrast with paediatric journals. Twitter correlated with a statistically significant overall mean increase in impact factor per urological journal (+0.22) compared with a mean decrease per paediatric journal (−0.1).

In order to determine whether this data were specialty-specific, the role of platform number and type, and impact factor across both 2-year and 4-year periods were further analysed. Interestingly, having an impact factor >2 correlated with the number of social media platforms provided ($P = 0.012$), and similarly, having a larger number of social media outlets was also correlated with having a higher impact factor ($P = 0.017$). It is possible that journals with a larger impact factor have larger readerships and represent larger institutions with an increased budget for social media provision; however, this has not previously been demonstrated. The presence of Twitter was also associated with a paediatric urology journal having a higher impact factor ($P = 0.022$). This may demonstrate levels of computer literacy and social media adoption across a new generation of physicians. Twitter can filter vast volumes of

research and highlight key papers, which can then be accessed through various subscriptions [15]. Cosco demonstrated that amongst general medical journals, Twitter followers increased by 0.78% for every 1% increase in impact factor, and by 0.62% for every 1% increase in citations. It was concluded that impact factor is related to Twitter following, with research receiving more mainstream attention [16]. Eysenbach also showed that Tweets can predict highly cited articles within the initial period of publication, and that social media activity either increases citations or reflects the underlying qualities of the article that also predict citations [17]. Scotti et al. further illustrated in a single-institution audit that altmetrics from social media platforms correlated with standard bibliometric indices of research quality and impact for published journal articles (Spearman's rho 0.88) [18].

It was wondered if these trends would persist in the 19 journals that exhibited a sustained rise in impact factor. The present study showed that this sustained rise correlated on multivariate analysis with having the presence of a Twitter account ($P = 0.017$). The number of social media platforms was not significant across time, nor was initial impact factor. Another new concept is that of the 'Twitter impact factor' (TIF) based on the number of re-Tweets following a journal's original Tweet about an article's content. It was demonstrated that European Urology (1.80) and BJU International (1.46) had the highest TIFs, with a positive but statistically insignificant association between the TIF and JIF ($r = 0.64$, $P = 0.12$) [19]. It could be argued that there may be other factors in play despite uncovering a statistically significant association, and maybe a Bonferroni correction should be applied. However, it does not make sense to differently evaluate a statistic depending on the number of tests in a particular study. When correcting for multiple comparisons, it could be argued that Bonferroni can artificially inflate type-2 errors, because many null hypotheses are unlikely nil hypotheses.

There was also an increase in parental health-seeking behaviour online across a number of conditions. Wasserman et al. analysed 91 websites for the online quality of patient information regarding colorectal cancer treatment, and found it to be highly variable and incomplete; they implored organisations to create more comprehensive online patient materials [20]. Borgmann et al. examined 28 physician provided and 15 publically provided websites on robotic prostatectomy to evaluate their qualitative characteristics, and showed that general populace readability was poor and needed improvement [21]. Farhat et al. investigated the online presence of paediatric surgery departments in Germany and concluded that less than one third offered information about the conditions they treated, and that features such as ranking, accessibility and use of social media were lacking [22]. Gill et al. explored the digital footprint of 247 academic urologists, and showed that social media use was poorly visible and could be exploited to increase exposure [23]. These publications serve as a surrogate for the appetites of patients and parents to accessing online health information. Hospitals and healthcare providers within the United States have recognised a change in the interaction of patients with their treating institutions, and have accepted the importance of a social media presence. Huerta et al. performed a census assessment of 2407 websites across 2785 facilities, and showed that as a core competency, social media was at the 'confluence of marketing prowess' [24].

The present study also explored the awareness and attitudes to social media of parents and patients attending the outpatient clinic. Parents of children attending the paediatric outpatients were younger than the adult patient cohort, and as a group, statistically had higher rates of social media account ownership (across several platforms). Those that had SoMe accounts also used them more often than the adult hospital cohort ($P < 0.001$). Given the opportunity, this cohort would also be more likely to access their social media accounts for learning about medical conditions ($P < 0.001$), and have completed a higher level of education ($P = 0.04$). This health-seeking behaviour has previously been described by Hand et al., who examined parental attitudes towards their children's illness, and showed that access to a smartphone, third-level education and health insurance positively influenced online searches, and while clinician-sourced information remained important, it was important to engage with patients to utilize online resources [25]. Interestingly, the present study also demonstrated that parents would be more likely to access their physician's personal social media account than the adult cohort ($P < 0.001$); the most common reason for this was curiosity, followed by information gathering. Parents also felt that physicians/healthcare providers should have a social media presence ($P < 0.001$).

Despite the overwhelming appetite of parents for social media in this paediatric urology cohort, a number of important caveats remained for the physician/organisation. Murphy et al. published guidelines for the appropriate use of social media through the BJU International to avoid potential pitfalls with its use [26]. It is important to vigilantly recognise that social media remains a public forum, and to ensure that guidelines are at least read, if not adopted. Fuoco and Leveridge demonstrated that 19% of urologists had read published guidelines for the professional use of social media [9]. In order to inform and protect its members, The American College of Physicians has also published a comprehensive policy statement to guide the use of online activity [27].

Whilst this study was the first to explore the correlation between social media and impact factor in paediatric urology, and the first in its field to assess the attitudes of parents to social media, there were limitations. The questionnaire used to assess awareness and attitudes of patients and parents was not externally validated. There may have been bias in larger journals that generate and maintain social media platforms such as Twitter, which may in turn have had an influence on impact factor. There may have been a 'chicken and egg' question as to whether social media has a role in driving impact factor. It should also be noted that many journals with lower impact factors simply represent a more specialised readership, and therefore, the volume of SoMe activity may not reflect the quality of published research, but the size of the readership and likelihood of generating downloads or citations. The present study did not demonstrate a causation between SoMe and impact factor, merely an association. In an attempt to standardise social media content, attempts have also been made to standardise the hash tag (#) lexicon in Twitter through the Urology Tag Ontology project. This study may

help to define and categorise not only how physicians communicate through social media, but also allow for more efficient searches by patients and parents [28]. Social media offers an opportunity to engage with and positively influence patients and their families on a scale that has never been previously considered. The present study has shown that SoMe use and awareness of this particular cohort is much higher than previous generations. However, by investing in these resources, it would also appear that there is an association with higher journal impact factors, thus leading to a mutually beneficial relationship.

Conclusion

Social media use within paediatric urology is associated with a higher journal impact factor. Parents are more likely to use a wide variety of social media to search for conditions and providers. Therefore, the quality of information being easily accessible to patients must be of high quality, and preferably endorsed by a professional body. Journals and institutions need to consider embracing SoMe as a potential source of important clinical information.

Conflict of interest

None.

Sources of funding

None.

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