

Widespread use of internet, applications, and social media in the professional life of urology residents

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Cite as: *Can Urol Assoc J* 2017;11(9):E355-66. <http://dx.doi.org/10.5489/cuaj.4267>
Published online September 12, 2017

Abstract

Introduction: Digital media have revolutionized communication and information dissemination in healthcare. We aimed to quantify and evaluate professional digital media use among urology residents.

Methods: We designed a 17-item survey to assess usage and perceived usefulness of digital media, as well as communication type and device type and distributed it via email to 143 Canadian and 721 German urology residents.

Results: In total, 58 (41% response rate) residents from Canada and 170 (24% response rate) from Germany reported professional usage rates of 100% on the internet, 89% on apps, and 46% on social media (SoMe). For professional use, residents spent a median of 30 minutes per day on the internet, 10 minutes on apps, and 15 minutes on SoMe. 100% rated the internet, 89% apps, and 31% SoMe as useful for clinical practice. Most (94%) used digital media for communication with colleagues and 23% for communication with patients. Digital media use was allocated to desktop computers (55%) and mobile devices (45%). Canadian residents had higher usage rates of apps (96% vs. 86%; $p=0.042$) and SoMe (65% vs. 39%; $p=0.002$) and longer daily usage times for the internet, apps, and SoMe than German residents ($p<0.001$ each).

Conclusions: Digital media are an integral part of the daily professional practice of urology residents, reflected by high usage rates and perceived usefulness of the internet and apps, and the growing importance of SoMe. Urologists should strive to progressively exhaust the vast potential of digital media for academic and clinical practice.

Introduction

Digital media, like the internet, mobile applications (apps), and social media (SoMe) have revolutionized communica-

tion and information dissemination in healthcare.¹⁻³ The internet builds the largest medical library and it is searched extensively for health information, with the 10 most popular health websites counting more than 300 million visitors a month.^{4,5} Currently, more than 165 000 health apps are available and the numbers are growing.⁶ Global SoMe use comprises 2.3 billion active accounts.⁷ This is further emphasized by 1.4 billion healthcare-related Twitter tweets that the healthcare SoMe analytics tool, Symplur (www.symplur.com), has recorded.⁸ In urology, digital media have been used to provide information on urological websites,⁹⁻¹¹ to search health information using urological apps during clinical practice,² and to interact on SoMe for academic and clinical purposes.^{3,12-14}

Urologists are at the forefront of SoMe use, with private usage rates varying between 49% among urologists in Canada and 86% among residents from the American Urological Association (AUA) in 2013;¹⁵⁻¹⁷ however, only an assessment of professional use can help to determine the value of digital media for clinical practice and academic exchange. There are some preliminary data on professional usage rates of digital media: 94% for the internet,¹⁸ 78% for apps,² and 8–21% for SoMe;^{16,17} however, pure usage rates cannot assess the amount of time spent using digital media and their actual value. To understand the impact of digital media on daily clinical and academic work, the quantity and quality of their use have to be assessed. This is especially important for urology residents who are “digital natives,” and as early adopters might predict the use of digital media in the coming years.

We aimed to quantify professional digital media use among urology residents, assess its usefulness, and test for intercontinental differences between Canada and Germany. We hypothesized that urology residents rated digital media useful and used them frequently in daily practice. Moreover, there might be differences between the two countries.

Methods

We followed the Checklist for Reporting Results of Internet-E-Surveys (CHERRIES).¹⁹ A 26-item online survey in English and German evaluated the professional use of digital media among urology residents in Canada and Germany (Appendix 1). We investigated new media use in Canada to follow up on previously reported studies of SoMe and web use.^{2,16,17,20} Moreover, we added Germany to include a mainland European cohort. We also conducted the study in the U.S., Australia, and the U.K. Due to very low return rates of <10 % we did not include these samples in our analysis.

The survey consisted of three domains: an introduction part assessing baseline characteristics, a second part determining the use and perceived usefulness of digital media for clinical practice, and a third part focusing on education. The third part was excluded from this analysis due to a different subject of discussion resulting in a 17-item survey (S1 material). Baseline characteristics consisted of age and year in training of the participant. The estimated usage time in minutes for professional use of the internet on web browsers, apps on mobile devices, and SoMe could be stated on an open scale. We reported usage times for actual users only. The perceived usefulness of every modality was rated on a five-point Likert scale. We grouped responses on usefulness into three categories (agree, uncertain, and disagree). The contributors reported the percentage of professional device use and how their internet, apps, and SoMe use were distributed. We asked for what purpose the smartphone or tablet computer and medical apps were used. We assessed SoMe use at conferences, SoMe guidelines knowledge, and the different SoMe platforms used for private and/or professional purposes. We asked the participants for the type of media they use for communication with colleagues and patients. Regarding communication methods, we defined phone, typed letters, and fax as conventional and e-mail, text message, and SoMe as digital media. All of the members of our working group piloted the survey. No technical problems occurred, but we modified certain words to improve understanding. Finally, the survey was tested with four volunteers.

For distribution of the survey, we used the online platform www.surveymonkey.com (SurveyMonkey, Portland, OR, U.S.). The Canadian and German collectors were open from September until November 2015. The Canadian survey was distributed to 143 urology residents after all program directors had been contacted. The German survey was distributed to 721 urology residents via the mailing list of the German Society of Residents in Urology and the German Society of Urology. As an incentive to participate, responders were offered a chance to win an iPad in a raffle. A reminder was sent to both target populations after four weeks.

Values were expressed as mean \pm standard deviation (SD) or median plus interquartile range (IQR) as appropriate.

Student's t-test was used to compare continuous variables with normal distribution. The Mann-Whitney-U test was used for continuous variables without normal distribution. Furthermore, Pearson's chi-square test was used for categorical variables to assess differences between the groups. A p value of less than 0.05 was considered significant. Statistical calculations were performed using the Statistical Package for the Social Sciences 23.0 software (SPSS Inc., Chicago, IL, U.S.).

Results

In total, 58 (41%) residents from Canada and 170 (24%) residents from Germany completed the survey. The overall response rate was 26% (228/864). The overall population of 228 residents had a mean age of 30.1 ± 3.1 years and was in training year 3.3 ± 1.6 .

All contributors used the internet for professional purposes. Fig. 1 shows that the median usage time per day was 30 minutes (IQR 20–60). The distribution of the internet use was: 42% clinical practice, 24% education, 16% research, 16% communication, and 3% others; 93% of the contributors found the internet very useful and 6% found it useful for clinical practice (Fig. 2).

Professional use of apps accounted for a median of 10 minutes (IQR 5–30) per day (Fig. 1) and 89% of contributors used health apps. Usage time on apps was distributed on clinical practice (57%), education (17%), communication (12%), research (6%), and others (7%). 53% of the contributors found apps very useful for clinical practice, 36% found them useful, 10% were undecided, and 1% found them useless (Fig. 2). Medical apps were used in multiple ways, including information about drugs (89%), guidelines (74%), diagnostics (48%), treatment decisions (47%), nomograms (24%), and for patient information (10%).

Daily usage time of SoMe had a broad range from 0–120 minutes (median: 0, IQR 0–10; Table 1, Fig. 1) among urology residents. Forty-six percent of the contributors used SoMe in a professional capacity. Among these SoMe users, median usage time was 15 minutes (IQR 5–30). SoMe use was allocated to: 44% communication, 17% clinical practice, 15% education, 15% others, and 9% research. Fig. 2 highlights that 31% of survey responders rated SoMe as useful for clinical practice, while 37% rated it as not useful. Fifty-seven percent of residents used SoMe in the context of a medical conference. Overall, private and/or professional SoMe usage rate was 97% among residents with YouTube, Facebook, and Skype being the most popular platforms (Fig. 3). Thirty-four percent of professional SoMe users and 20% of all survey responders stated that they know guidelines on the appropriate professional use of SoMe.

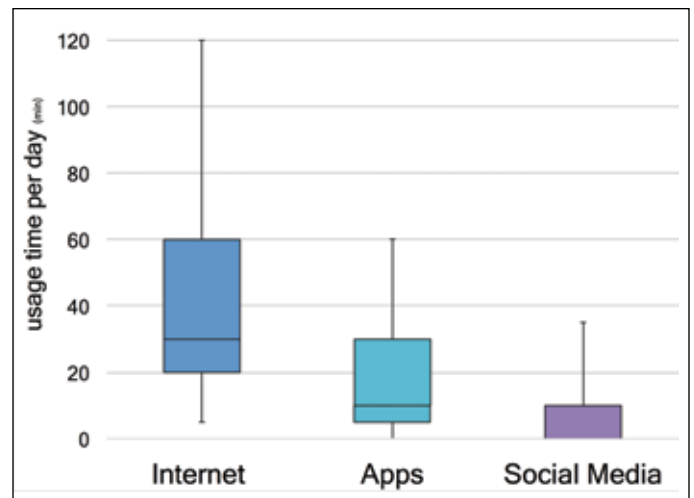
For communicating with colleagues, residents used the phone (93%), typed letters (22%), fax (29%), e-mail (81%),

Table 1. Comparison of professional use of the internet, apps, and social media in Canada and Germany

	Canada	Germany	p
Age and training year of the contributors			
	Mean ± SD		
Age	28.6 ± 3.1	31 ± 2.9	<0.001*
Year of residency	3.1 ± 2	3.4 ± 1.4	0.053
How many minutes a day do you spend professionally on...?			
	Median (IQR; range)		
Internet	60 (30–79; 15–200)	30 (20–60; 5–200)	<0.001*
Apps	28 (10–30; 0–180)	10 (5–19; 0–180)	<0.001*
Social media	10 (0–30; 0–75)	0 (0–9; 0–120)	<0.001*
Usage rates of digital media (%)			
Internet	100	100	N/A
Apps	96	86	0.042*
Social media	65	39	0.002*
Internet is useful for clinical practice (%)			
Agree	97	100	0.015*
Undecided	03	0	
Disagree	0	0	
Apps are useful for clinical practice (%)			
Agree	93	87	0.394
Undecided	7	12	
Disagree	0	1	
Social media platforms are useful for clinical practice (%):			
Agree	43	26	<0.001*
Undecided	41	3	
Disagree	16	43	
If you use digital media, what percentage of your professional use will be through the following devices? (%)			
Desktop computer	17	68	<0.001*
Laptop	28	14	<0.001*
Smartphone	4	15	<0.001*
Tablet	15	3	<0.001*
Do you know guidelines for the professional use of social media? (%)			
Yes	46	11	<0.001*
No	54	89	<0.001*

*Statistically significant. IQR: interquartile range; N/A: not applicable; SD: standard deviation.

text messages (75%), SoMe (30%), and other tools (5%). In all, 93% used conventional communication methods and 94% used digital media for communication with colleagues. For communication with patients, 88% used the phone, 68% typed letters, 31% fax, 23% e-mail, and 4% other communication tools. In all, 94% used conventional communication methods and 23% used digital media for communication with patients ($p<0.001$). Digital media use was allocated to desktop computers (55%) and mobile devices (combined 45%; laptop 17%, smartphone 22%, tablet computer 6%). The smartphone or tablet computer was used professionally

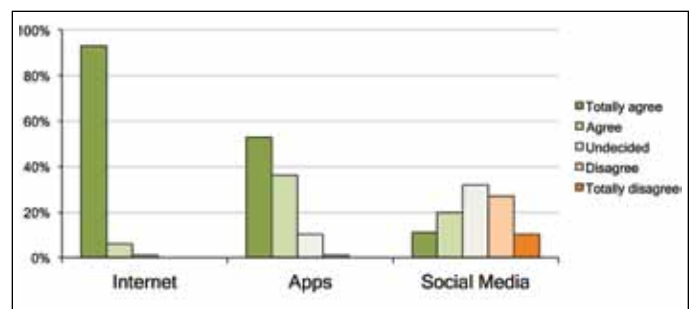
**Fig. 1.** Daily professional use of digital media.

for phone calls (64%), text messages (46%), mobile browsing (75%), SoMe (23%), and apps (72%); however, 11% were not using a smartphone or tablet computer professionally.

Table 1 shows a comparison of responses by Canadian and German residents. The professional usage rate of apps was higher in Canada than in Germany (96% vs. 86%; $p=0.042$). Accordingly, the professional usage rate of SoMe was higher in Canada than in Germany (65% vs. 39%; $p=0.002$). Daily professional usage time was longer for the internet (median: 60 vs. 30 minutes; $p<0.001$), apps (28 vs. 10 minutes; $p<0.001$), and SoMe (10 vs. 0 minutes; $p<0.001$) among Canadian residents. In Canada, mobile devices were used more frequently than in Germany (83% vs. 32%; $p<0.001$). Canadian residents rated SoMe as useful for clinical practice more often than German residents (65% vs. 39%; $p<0.001$). Almost half of the Canadian residents (46%) were familiar with guidelines on the professional use of SoMe, while 11% of German residents knew SoMe guidelines ($p<0.001$). Additional survey answers comparing Canadian and German residents are listed in Appendix 2.

Discussion

Professional internet use is an integral part of daily practice among urology residents. Every participating resident

**Fig. 2.** Perceived usefulness of digital media for clinical practice.

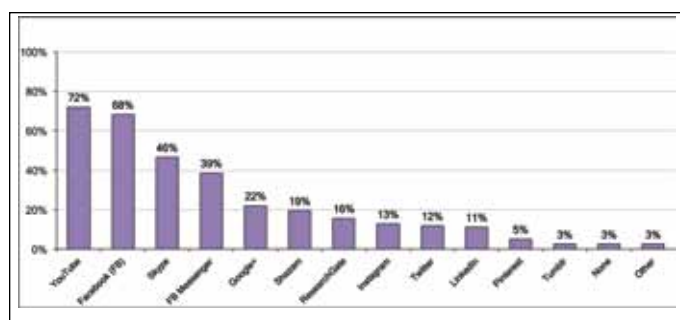


Fig. 3. Usage rates of social media platforms.

used the internet for a median of 30 minutes a day in a professional capacity. Impressively, 93% found the internet very useful for clinical practice and no one stated the opposite. The internet provides multiple areas for useful application in clinical practice, such as checking clinical guidelines,²¹ searching specific drug information,²² or assessing nomograms or risk calculators for patient counselling.²³ Concerning online health information, quality assessments have to be performed regularly to ensure the correctness of information, as it has been recently presented for prostate cancer and robotic prostatectomy.^{9,10}

Almost as much as the internet, apps are an important part of the daily professional life of urology residents, with a median use of 25 minutes per day and a usage rate of 89%. Similar to the internet, 89% found apps useful or very useful for clinical practice. These data are in line with a survey among 36 urology residents from Ireland, which reported that 78% of them used health apps professionally and 87% rated apps as useful for clinical practice.² Meanwhile, the number of specific urological apps was steadily rising, with 150 apps available in 2015²⁴ and 60% of those specifically designed for physicians.² In short, the growing number, high usage rate, and versatile application of urology apps highlight their enormous potential as a useful aid for the urologist by providing structured health information instantly.

Professional SoMe adoption among Canadian and German residents was lower compared to the internet and apps, with 46%, but had risen considerably over the past years when compared to studies from 2013 that reported 20% for AUA resident members and 21% for members of the Canadian Urological Association.^{16,17} SoMe users spent a median of 15 minutes per day on SoMe in a professional capacity and used it mainly for communication. The general SoMe usage rate for both private and/or professional purposes was higher in this cohort (97%) than among AUA resident members (86%) in 2013 and among urologists from Australia and New Zealand (70%) in 2014, which can be explained by growing SoMe adoption rates and a younger cohort of urologists.^{17,20,25} Considering both the increase in adoption rates for private SoMe use among urologists (97% vs. 70–86%) and a more than 100% increase of professional SoMe use (46% vs. 21%) over a period of two years,

we might face an increasing integration of SoMe into the professional life of urologists in the coming years. Urologists already leave a digital footprint due to online activity.²⁶ The opinion on SoMe's usefulness for clinical practice is currently undecided. Meanwhile, medical students might serve as a good estimate for future urologists; 472 medical students reported an adoption rate of 89% for professional SoMe use and considered it as useful and innovative.²⁷

As the adoption rates of SoMe increase, urologists should know about guidelines on the ethically correct professional use of SoMe. Such recommendations have recently been proposed by the Canadian Medical Association and the German Medical Council.^{28,29} In our study, only 34% of the SoMe users knew about guidelines on the professional use of SoMe. Canadian urological residents were more aware of guidelines than the Germans (46% vs. 11%; $p < 0.001$), which might reflect a greater awareness of online professionalism since the majority of studies on this topic were performed in Anglo-Saxon countries.

Canadian residents have a higher usage rate of professional apps (96% vs. 86%; $p = 0.042$) and SoMe (65% vs. 39%; $p = 0.002$) when compared to German residents. The perceived usefulness of SoMe for clinical practice is higher among Canadian vs. German residents (43% vs. 26%; $p < 0.001$). Considering these numbers, Canadian residents would seem to be early adopters of SoMe, while German residents seem to be more reserved.¹⁶ One explanation for these findings might be the higher penetration rate and daily usage time of SoMe in the general population of Canada (58% active SoMe users, 86 minutes daily usage time per SoMe user) and Germany (36% active SoMe users, 68 minutes daily usage time per SoMe user).⁷ Another contributing factor might be the younger age of the Canadian residents cohort, since younger age was a predictor for SoMe uptake among American urologists.¹⁷

There are several limitations. The exact number of digital media sessions during the day and the duration of each session was not determined. Moreover, response rates were 41% in Canadian and 24% in German residents. Although our response rates are favourable or similar compared to previously reported digital media surveys,^{16,17} there is a risk of a relevant non-responder bias. It is possible that residents with a high social media adoption might be more likely to answer the survey. Also, we have to consider a selection bias because the survey was distributed through the internet, allowing only internet users to respond. Finally, digital media platforms are growing rapidly and changing constantly, which implies that the results of our contemporary analysis might be out of date in the near future.

Conclusion

Digital media are an integral part of daily professional practice among urology residents, as reflected by the very high usage rates and the perceived usefulness of the internet and

apps, as well as the growing importance of SoMe. Urologists should strive to make full use of the vast potential of digital media for academic and clinical practice.

Competing interests: The authors report no competing personal or financial interests.

Acknowledgements: The authors wish to thank all the residents for contributing to the survey. All authors, except for Andrew MacNeily, are members of the GeSRU Academics Working Group on digital media and health services research.

This paper has been peer-reviewed.

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Appendix 1

Dear doctors,

this short survey assesses the relevance of the Internet, social media, and apps for the daily work in urology. The results should be used to integrate new media constructively into clinical routines.

You will just need 10 minutes to complete the survey. All questions refer to the professional use of new media – if used at the workplace, at home or on the way.

Your responses are voluntary and will be confidential. All responses are anonymous and will be analyzed on group level only.

Thank you very much for your contribution!

1. How old are you? *(numbers only)*

2. In which year of your training are you? *(numbers only)*

3. How many minutes a day do you use in a professional capacity on ...*(numbers only)*

the internet (mails, searching for information)?

Social media (e.g. Facebook, YouTube) ?

Apps on your smartphone or tablet?

4. Internet is useful for clinical practice.

I totally agree

I agree

I am undecided

I disagree

I totally disagree

5. Apps are useful for clinical practice.

I totally agree

I agree

I am undecided

I disagree

I totally disagree

6. Social Media is useful for clinical practice.

I totally agree

I agree

I am undecided

I disagree

I totally disagree

1

7. If you use new media: What percentage of your professional use will be through the following devices? (*numbers only, total sum 100*)

Desktop-computer (in %)	<input type="text"/>
Laptop (in %)	<input type="text"/>
Smartphone (in %)	<input type="text"/>
Tablet (in %)	<input type="text"/>

8. For what do you use your smartphone or tablet professionally? (*multiple choice*)

- ☐ Phonecalls
- ☐ Text-messaging
- ☐ Mobile Browsing
- ☐ Social media
- ☐ Apps
- ☐ I don't use a smartphone/tablet

9. How is your professional use of the internet distributed? (*numbers only, total sum 100*)

Clinical practice (in %)	<input type="text"/>
Education (in %)	<input type="text"/>
Research (in %)	<input type="text"/>
Communication (in %)	<input type="text"/>
Other (in %)	<input type="text"/>

10. How is your professional use of medical APPs distributed? (*numbers only, total sum 100*)

Clinical practice (in %)	<input type="text"/>
Education (in %)	<input type="text"/>
Research (in %)	<input type="text"/>
Communication (in %)	<input type="text"/>
Other (in %)	<input type="text"/>

11. For which contents do you use medical apps? *(multiple choice)*

- ☐ Diagnostics
- ☐ Therapy decision
- ☐ Information about drugs / chemotherapeutics
- ☐ Guidelines
- ☐ Nomograms
- ☐ Patient explanation
- ☐ I don't use medical apps

Other (Please enter an other content)

12. How is your professional use of social media (Facebook, Twitter, Whatsapp, Youtube, ...) distributed? *(numbers only, total sum 100)*

Clinical practice (in %)	<input type="text"/>
Education (in %)	<input type="text"/>
Research (in %)	<input type="text"/>
Communication (in %)	<input type="text"/>
Other (in %)	<input type="text"/>

13. Do you use social media in the context of a medical conference (e.g. exchange of content)? *(Multiple choice)*

- ☐ Yes, if I attend the conference.
- ☐ Yes, even if I don't attend the conference.
- ☐ No

14. Which types of social media do you use for professional or private purposes?(multiple choice)

- ☐ Facebook
- ☐ Twitter
- ☐ Youtube
- ☐ Skype
- ☐ Google+
- ☐ Researchgate
- ☐ Whatsapp
- ☐ Facebook Messenger
- ☐ Shazam
- ☐ Instagram
- ☐ LinkedIn
- ☐ Pinterest
- ☐ Tumblr
- ☐ I don't use social media
- ☐ Other

15. Do you know guidelines for the professional use of social media?

- ☐ Yes
- ☐ No

16. Which type of media do you use regularly for communication with colleagues?(Multiple choice)

- ☐ Phone
- ☐ Typed letter
- ☐ Fax
- ☐ E-Mail
- ☐ Text message
- ☐ Social media
- ☐ Other

17. Which type of media do you use regularly for communication with patients?*(multiple choice)*

☐ Phone

☐ Typed letter

☐ Fax

☐ E-Mail

☐ Text message

☐ Social media

☐ Other

5

Appendix 2. Additional survey answers comparing Canadian (green) and German (purple) residents. *p<0.05

For what do you use your smartphone or tablet professionally?

Phone calls	86%	56%	<0.001*
Text-messaging	93%	31%	<0.001*
Mobile Browsing	85%	72%	0.053
Social Media	38%	18%	0.001*
Apps	86%	68%	0.006*
I don't use a smartphone/tablet	2%	14%	0.011

How is your professional use of the Internet distributed?

Clinical practice	29%	46%	<0.001*
Education	28%	23%	0.038*
Research	20%	14%	0.002*
Communication	21%	14%	0.001*
Other	2%	3%	0.63

How is your professional use of medical APPs distributed?

Clinical practice	55%	58%	0.524
Education	26%	14%	<0.001*
Research	7%	6%	0.466
Communication	6%	14%	0.073
Other	6%	8%	0.957

For which contents do you use medical apps?

Diagnostics	62%	35%	<0.001*
Therapy decision	59%	34%	0.001*
Information about drugs / chemotherapeutics	85%	78%	0.266
Guidelines	81%	62%	0.007*
Nomograms	47%	16%	<0.001*
Patient explanation	19%	5%	0.001*
I don't use medical apps	5%	14%	0.084

How is your professional use of Social Media distributed?

Clinical practice	12%	18%	0.031*
Education	12%	15%	0.832
Research	5%	8%	0.233
Communication	46%	43%	0.698
Other	25%	16%	0.404

Do you use Social Media in the context of a medical conference?

Yes, if I attend the conference.	49%	44%	0.534
Yes, even if I don't attend the conference.	12%	12%	0.832
No	39%	44%	0.446

Which types of Social Media do you use for professional or private purposes?

Whatsapp	64%	91%	<0.001*
Youtube	59%	78%	0.005*
Facebook	79%	71%	0.227
Skype	26%	54%	<0.001*
Facebook Messenger	59%	40%	0.014*
Google+	10%	24%	0.025*
Shazam	24%	21%	0.638
Researchgate	16%	14%	0.707
Instagram	35%	10%	<0.001*
Twitter	22%	11%	0.023*
LinkedIn	17%	7%	0.014*
Pinterest	9%	6%	0.468
Tumblr	2%	3%	0.617
None	5%	2%	0.162*
Other	2%	3%	0.617

Which type of media do you use regularly for communication with colleagues?

Phone	90%	94%	0.861
Typed letter	7%	27%	0.002*
Fax	7%	37%	<0.001*
E-Mail	93%	77%	0.006*
Text message	97%	67%	<0.001*
Social Media	22%	32%	0.153
Other	3%	6%	0.473

Which type of media do you use regularly for communication with patients?

Phone	80%	94%	<0.001*
Typed letter	44%	78%	<0.001*
Fax	12%	38%	<0.001*
E-Mail	8%	28%	0.001*
Text message	2%	0%	0.086
Social Media	0%	0%	NA
Other	10%	2%	0.034*