

Original Paper

The Prevalence and Characteristics of Emergency Medicine Patient Use of New Media

Lori Ann Post^{1*}, PhD; Federico E Vaca^{1*}, MD, MPH; Brian J Biroscak^{1*}, MS, MA, PhD; James Dziura^{1*}, MPH, PhD; Cynthia Brandt^{1*}, MD, MPH; Steven L Bernstein^{1*}, MD; Richard Taylor^{1*}, MD; Liudvikas Jagminas^{2*}, MD; Gail D'Onofrio^{1*}, MD, MS

¹Yale School of Medicine, Department of Emergency Medicine, Yale University, New Haven, CT, United States

²Beth Israel Deaconess Medical Center, Department of Emergency Medicine, Harvard University, Boston, MA, United States

* all authors contributed equally

Corresponding Author:

Lori Ann Post, PhD
Yale School of Medicine
Department of Emergency Medicine
Yale University
464 Congress Ave
Suite 260
New Haven, CT, 06519
United States
Phone: 1 203 980 7107
Fax: 1 203 785 4172
Email: lori.post@yale.edu

Abstract

Background: Little is known about “new media” use, defined as media content created or consumed on demand on an electronic device, by patients in emergency department (ED) settings. The application of this technology has the potential to enhance health care beyond the index visit.

Objective: The objectives are to determine the prevalence and characteristics of ED patients’ use of new media and to then define and identify the potential of new media to transcend health care barriers and improve the public’s health.

Methods: Face-to-face, cross-sectional surveys in Spanish and English were given to 5,994 patients who were sequentially enrolled from July 12 to August 30, 2012. Data were collected from across a Southern Connecticut health care system’s 3 high-volume EDs for 24 hours a day, 7 days a week for 6 weeks. The EDs were part of an urban academic teaching hospital, an urban community hospital, and an academic affiliate hospital.

Results: A total of 5,994 (89% response rate) ED patients reported identical ownership of cell phones (85%, $P < .001$) and smartphones (51%, $P < .001$) that were used for calling (99%, $P < .001$). The older the patient, however, the less likely it was that the patient used the phone for texting (96% vs 16%, $P < .001$). Income was positively associated with smartphone ownership ($P < .001$) and the use of health apps ($P > .05$) and personal health records ($P < .001$). Ownership of iPhones compared to Android phones were similar (44% vs 45%, $P < .05$). Race and ethnicity played a significant role in texting and smartphone ownership, with Hispanics reporting the highest rates of 79% and 56%, respectively, followed by black non-Hispanics at 77% and 54%, respectively, and white non-Hispanics at 65% and 42%, respectively ($P < .05$).

Conclusions: There is a critical mass of ED patients who use new media. Older persons are less comfortable texting and using smartphone apps. Income status has a positive relationship with smartphone ownership and use of smartphone apps. Regardless of income, however, texting and ownership of smartphones was highest for Latinos and black non-Latinos. These findings have implications for expanding health care beyond the ED visit through the use of cell phones, smartphones, texting, the Internet, and health care apps to improve the health of the public.

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KEYWORDS

medical informatics; new media; health care services; personal health management; mobile phones

Introduction

New media is part of the communication science lexicon—yet it is frequently omitted from the health care literature and often is incorrectly interchanged with cell phones. “New media” is defined as media content created or consumed on demand on an electronic device (eg, mobile phones, computers, tablets, etc) [1-8]. In contrast, simple cell phone technology does not support health apps or Web browsing for health information. While most cell phones also have other communication modes beyond a simple telephone, such as texting, there is an age cohort effect whereby the elderly population is more likely to only use the phone features because that population is less comfortable texting or using mobile phone apps [9-15]. Thus, cell phones must be thought of as a subcategory of new media and distinct from mobile phones. New media has unrealized potential to improve health outcomes compared to traditional or legacy media (eg, print materials, radio, television, etc) [16-23].

According to Jenkins, new media can be thought of “as the convergence of 3 concepts—media convergence, participatory culture, and collective intelligence” [24]. With new media, consumers “interact with” a digital device as opposed to being “exposed to” legacy media, which is passive media spectatorship [24-29]. Therefore, new media has a greater potential to improve patient care and health outcomes [13,30-34]. Mobile phones, tablets, laptops, and desktops allow the consumer to search health information repositories, or “collective intelligence,” related to their health condition [35-37]. “Media convergence” refers to how patients interact with each other or experts [38-41] (eg, chat rooms for women with breast cancer) [42-45]. And a “participatory culture” allows active engagement in treatment [46-48] (eg, messaging medication adherence or provider communication) [49-51]. Engaged patients experience better health outcomes and higher satisfaction [52-58]. The purpose of this study is to improve our understanding of the prevalence, uses, and typology of new media in the emergency department

(ED) care setting [59-65]. We theorize that if a critical mass of patients are using new media, it may drive a paradigm shift in health care delivery by enhancing care beyond the ED visit.

Methods

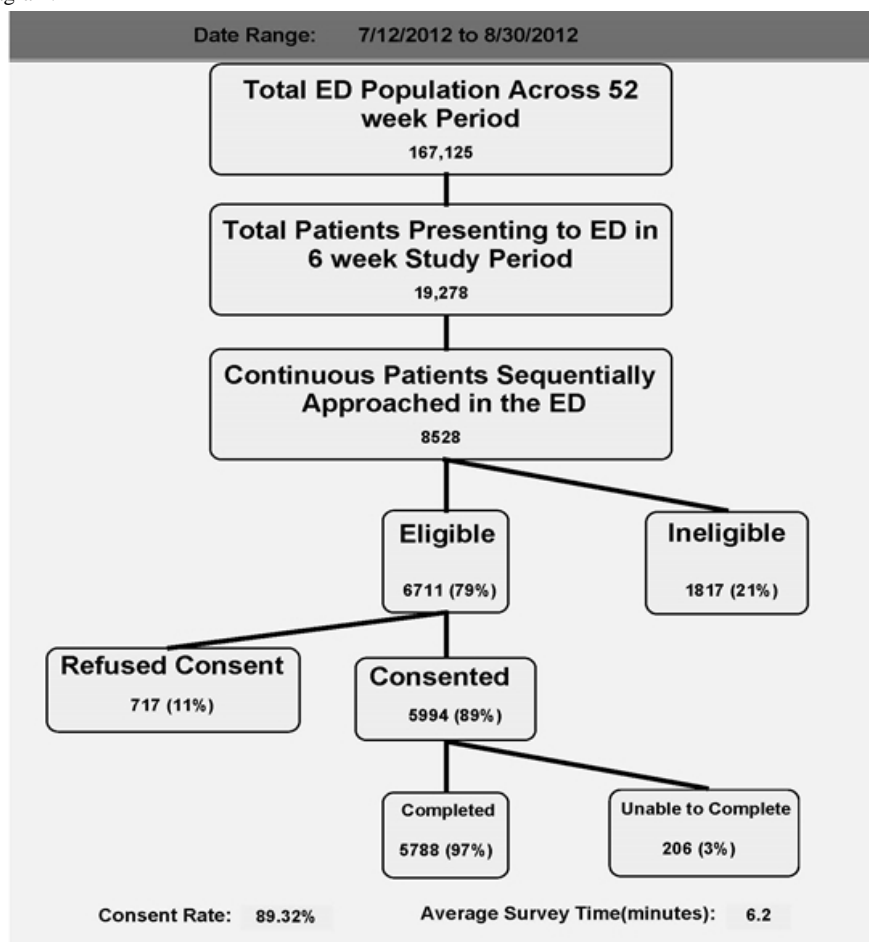
Overview

We designed and administered a cross-sectional survey of patients presenting to 3 EDs in southern Connecticut that are part of the Yale-New Haven Health System (YNHHS). Data were collected over 24 hours a day, 7 days a week for a total of 6 weeks. During the study period, the annual census for Yale-New Haven Hospital York Street Campus, an urban academic teaching hospital, was approximately 81,000 adult visits per year and serves a population that is 52% white, 28% black, and 18% Hispanic, with 40% receiving Medicaid. Bridgeport Hospital, an urban academic affiliate of YNHHS, receives approximately 45,000 adult visits per year and serves a population that is 44% white, 38% black, and 15% Hispanic, with 46% receiving Medicaid. The annual census for the Saint Raphael Campus ED, best described as an urban community ED, was approximately 45,000 visits per year and serves a population that is 36% white, 31% black, and 34% Hispanic, with 50% receiving Medicaid.

Selection of Participants

Research assistants (RAs) enrolled patients presenting to 1 of the 3 EDs. Twenty-two trained RAs enrolled patients on every ED shift, 24 hours a day, 7 days a week, during a 6-week period (July 12 to August 30, 2012). Patients were excluded if they were 17 years of age or younger; alcohol or drug impaired; had a condition that precluded interview; were in police custody; had active psychosis, suicidal, or homicidal ideation; or were unwilling to consent. RAs entered patient data into the electronic data capture system based on time of patient arrival (Figure 1). The institutional review board of each participating hospital approved all study procedures.

Figure 1. Patient flow diagram.



Data Collection and Analysis

Our research consortium reviewed and selected questions from the information technology study conducted at Brown University's ED [66], by the Department of Veterans Affairs [67], and some instruments from health communication literature [68]. Our multidisciplinary research group consisted of individuals with expertise in informatics, emergency medicine, bioinformatics, engineering, and social sciences who recommended validated questions to include on the survey instrument based on their specific areas, such as media usage [69,70], substance abuse [71,72], tobacco use [73,74], the elderly [75-81], public health records [82], veterans [83], and ethnic minorities [84-86]. The survey was derived from other validated survey or screening questionnaires and new media surveys in combination with original questions specific to the ED, health care, and patient populations. Participants were asked a series of questions representing a number of domains, such as: (1) new media technology ownership (eg, "Do you own a cell phone?"); (2) new media use (eg, "What do you use your cell phone for? Check ALL that apply."); (3) type of technology owned (eg, "Is your cell phone a mobile phone (eg, iPhone, BlackBerry, Android?"); and (4) frequency of use (eg, "How often do you use your cell phone for text messaging?"). Contingent on answers to these prior questions, participants were asked about new media behaviors such as: (1) seeking health information (eg, "Do you use your cell phone to look up health information?"); and (2) tracking or managing one's health

(eg, "Do you use a software application on your phone to help you track or manage your health?"). The survey ended with the collection of the following demographic data: age, gender, ethnicity, race, preferred language, highest level of education completed, rural/urban status, and annual household income.

The survey was pilot tested over the course of 1 month (with observers) and tested for fourth grade Flesch-Kincaid readability. Some data regarding race were missing (<1%) due to confusion between "race" and "ethnicity." Thus, participants who reported Latino/Hispanic as a racial category were corrected using hot deck imputation [87-98].

We compared ED patients' new media use between 3 urban EDs in southern Connecticut. The survey was conducted in English and Spanish. We derived point estimates with 95% confidence intervals (CI) using the normal-theory method for a binomial parameter. Variables of interest include *P*-values based on the test for a binomial proportion. Analyses were performed using SPSS version 20 (IBM Corp, Armonk, NY).

Results

A total of 5994 (89% response rate) ED patients consented to participate in the study from southern Connecticut (Figure 1). The average time for survey completion was 6.2 minutes. The 3 EDs within the health care system are presented disaggregated and then were combined for purposes of analysis (Table 1). A total of 58.43% (3382/5788) of ED users were female; the mean

age was 46 years old; whites comprised 42.14% (2410/5719), blacks 34.11% (1951/5719), and Latinos 23.75% (1358/5719) of the patient population; 2.95% (171/5788) of the participants elected to complete the survey in Spanish; 14.60% (845/5788) of the respondents had none to some schooling; and 39.38% (1775/4507) of the ED patients earned less than \$15,000 per year. There was little if any variation among the 3 EDs, with the exception of income. A total of 47.10% (674/1431) of Saint Raphael's patients earned less than \$15,000 per year while only 34.97% (583/1667) of Yale-New Haven York Street Campus patients reported an income in this bracket (Table 1). ED patients reported high ownership of cell phones (4934/5788, 85.25%, $P<.001$) and mobile phones (2500/4934, 50.67%, $P<.001$) that were used for calling (4892/4934, 99.15%, $P<.001$). The older the patient, the less likely it was that the patient used their cell phone for texting (96% of 18-29 year olds vs 16% of those age 65 or older, $P<.00$). Ownership of iPhones (1093/2500, 43.72%) compared to Androids (1117/2500, 45.88%) were similar ($P<.05$). Of those patients with a contract, 49.57% (2446/4934) reported having unlimited minutes and 49.57% (2446/4934) reported having limited minutes. Furthermore, 20.25% (999/4934) of patients reported having a pay-as-you go plan, which may or may not have included a contract. Finally, 4.32% (213/4934) of patients reported owning a Medicaid phone (aka, "Obama phone") (Table 2). Income was positively associated with mobile phone ownership ($P<.001$), use of health apps ($P>.05$), and use of personal health records ($P<.001$) (Table 3). Race played a significant role in texting and mobile phone ownership, with Hispanics reporting the highest rates (79% and 56%, respectively), followed by black non-Hispanics (77% and 54%, respectively) and white non-Hispanics (65% and 42%, respectively) ($P<.05$). ED users also demonstrated higher rates of African American and Latino patients (34% and 24%, respectively). In summary, ED patients had high rates of minorities, no to little education, and low income (Table 3).

While not directly comparable, as these 2 surveys are from 2 different sampling frames, the Pew Foundation and the California HealthCare Foundation (CHCF) conducted a similar media health care study during the same time period [99]. Coincidentally, ED patients in our study had identical ownership of cell phones benchmarked against the Pew-CHCF study (4934/5788, 85.25%, $P<.001$). Income impacted the type of mobile phone and the nature of the contract, however, functionality remains identical. Basic functions such as calling (4892/4934, 99.15%, $P>.05$) and texting (3595/4935, 72.86%, CI 95% 72-74) were high (Table 2). Internet connections for browsing (2283/4934, 46.27%, 95% CI 45-48), e-mailing (2081/4934, 42.18%, 95% CI 41-44), and social networking (1903/4934, 38.57%, 95% CI 37-40) were less prevalent. Among all cell phone owners, 50.67% (2500/4934, 95% CI 49-52) reported that their device was a mobile phone. The Pew-CHCF study had a rate of 53%, meaning that ED users have 1% fewer mobile phones when benchmarked against the general population. iPhones were more pervasive among higher income ED patients than lower income patients; however, the functionality of Android phones is identical in terms of apps, texting, and Web browsing capability.

Table 3 demonstrates the health care utility for new media beyond calling capabilities according to selected demographic characteristics. The youngest age cohort of 18-29 years old reported the highest rates of texting (96%) compared to the older patients, significantly higher rates of mobile phones (79%, $P<.001$), high rates of using new media to seek health information (65%, $P<.001$). Among the eldest ED patients, those 65 years old or older, the highest rates were for using health apps (16%, $P<.05$) and seeking health information (33%, $P<.001$). African Americans (54%, $P<.001$) and Latinos (56%, $P<.001$) in the ED reported significantly higher rates of mobile phone ownership than whites (44%, $P<.05$). There was a similar pattern for seeking health information.

Table 1. Demographic breakdown of 3 emergency departments, July 12 to August 30, 2012.

Demographic	ED #1 Yale-New Haven Hospital York Street Campus	ED #2 Yale-New Haven Hospital Saint Raphael Campus	ED #3 Bridgeport Hospital	Total All EDs, combined (N=5788)
Female	1081/1922 (56.24%)	1177/1966 (59.87%)	1124/1900 (59.16%)	3382/5788 (58.43%)
Mean age, year (SD)	45 (18)	48 (21)	44 (19)	46 (20)
White, Non-Hispanic	891/1888 (47.19%)	889/1954 (45.50%)	630/1877 (33.56%)	2410/5719 (42.14%)
Black, Non-Hispanic	567/1888 (30.03%)	774/1954 (39.61%)	610/1877 (32.50%)	1951/5719 (34.11%)
Hispanic	430/1888 (22.78%)	291/1954 (14.89%)	637/1877 (33.94%)	1358/5719 (23.75%)
Spanish language survey	68/1922 (3.54%)	51/1966 (2.59%)	52/1900 (2.74%)	171/5788 (2.95%)
None to some schooling	253/1922 (13.16%)	304/1966 (15.46%)	288/1900 (15.16%)	845/5788 (14.60%)
Income <\$15,000	583/1667 (34.97%)	674/1431 (47.10%)	518/1409 (36.76%)	1775/4507 (39.38%)

Table 2. New media use prevalence and taxonomies, July 12 to August 30, 2012.

New media profile		ED #1	ED #2	ED #3	Total
		Yale-New Haven Hospital York Street Campus	Yale-New Haven Hospital Saint Raphael Campus	Bridgeport Hospital	All EDs combined (N=5788)
Cell phone ownership		1677/1922 (87.25%)	1591/1966 (80.93%)	1666/1900 (88.68%)	4934/5788 (85.25%, 95% CI 84-86)
Cell phone use	Calling	1666/1677 (99.34%)	1572/1591 (98.81%)	1654/1666 (99.28%)	4892/4934 (99.15%, 95% CI 98.9-99.4)
	Texting	1235/1677 (73.64%)	1141/1592 (71.72%)	1219/1666 (73.17%)	3595/4935 (72.86%, 95% CI 72-74)
	E-mailing	654/1677 (39.00%)	624/1591 (39.22%)	803/1666 (48.20%)	2081/4934 (42.18%, 95% CI 41-44)
	Surfing Internet	762/1677 (45.44%)	652/1591 (40.98%)	869/1666 (52.16%)	2283/4934 (46.27%, 95% CI 45-48)
	Social networking	664/1677 (39.59%)	545/1591 (34.26%)	694/1666 (41.66%)	1903/4934 (38.57%, 95% CI 37-40)
	Playing games	422/1677 (25.16%)	430/1591 (27.03%)	564/1666 (33.85%)	1416/4934 (28.70%, 95% CI 27-30)
	Mobile phone ownership	837/1677 (49.91%)	716/1591 (45.00%)	947/1666 (56.84%)	2500/4934 (50.67%, 95% CI 49-52)
Mobile phone operating system	iPhone	404/837 (48.27%)	278/716 (38.83%)	411/947 (43.40%)	1093/2500 (43.72%, 95% CI 42-46)
	Android	333/837 (39.78%)	333/716 (46.51%)	451/947 (47.62%)	1117/2500 (44.68%, 95% CI 43-47)
Mobile phone contract type	Contract, Limited Min	909/1677 (54.20%)	687/1591 (43.18%)	850/1666 (51.02%)	2446/4934 (49.57%, 95% CI 48-51)
	Contract, Unlimited Min	909/1677 (54.20%)	687/1591 (43.18%)	850/1666 (51.02%)	2446/4934 (49.57%, 95% CI 48-51)
	Medicaid phone (aka Obama phone)	66/1677 (3.94%)	84/1591 (5.28%)	63/1666 (3.78%)	213/4934 (4.32%, 95% CI 4-5)
	Pay-as-you-go	255/1677 (15.21%)	391/1591 (25.58%)	353/1666 (21.19%)	999/4934 (20.25%, 95% CI 19-21)

Table 3. New media device ownership and use by ED survey participants versus Pew-CHCF study data, July 12 to August 30, 2012.

Demographic (N=5788)		Text Messaging, 73% (CI 95% 72-74)			Mobile Phone Ownership, 51% (CI 95% 49-52)			Use of Health Apps, 19% (CI 95% 17-21)			Health Info Seeking, 60% (CI 95% 58-62)			Personal Health Records, 6% (CI 95% 6-8)
		EDs	Pew-CHCF	P	EDs	Pew-CHCF	P	EDs	Pew-CHCF	P	EDs	Pew-CHCF	P	EDs
Gender	Men	68 (66-71)	81	<.001	47 (45-49)	46	>.05	17 (15-20)	16	>.05	53 (49-56)	29	<.001	7 (6-8)
	Women	76 (74-77)	80	<.001	53 (52-55)	45	<.001	20 (18-22)	23	.007	64 (62-67)	33	<.001	6 (5-7)
Age	18-29	96 (95-97)	97	.04	79 (77-81)	66	<.001	18 (16-21)	24	<.001	65 (62-68)	42	<.001	7 (5-8)
	30-49	84 (82-85)	92	<.001	54 (52-57)	59	<.001	20 (18-23)	19	>.05	57 (53-60)	39	<.001	8 (7-9)
	50-64	55 (52-58)	72	<.001	30 (27-33)	34	.004	17 (11-22)	16	>.05	53 (47-60)	19	<.001	7 (5-8)
	65+	16 (13-19)	34	<.001	10 (7-12)	11	>.05	16 (4-27)	10	>.05	33 (19-47)	9	<.001	2 (1-2)
Race/Ethnicity	White, Non-Hispanic	65 (63-67)	79	<.001	44 (42-46)	42	>.05	21 (18-24)	19	>.05	61 (58-65)	27	<.001	8 (6-9)
	Black, Non-Hispanic	77 (75-79)	80	.008	54 (51-56)	47	<.001	17 (15-20)	21	.01	57 (54-61)	35	<.001	5 (4-5)
	Hispanic	79 (77-82)	85	<.001	56 (53-59)	49	<.001	18 (15-21)	15	.03	61 (57-65)	38	<.001	6 (5-7)
Annual Household Income	<\$30,000	71 (69-73)	78	<.001	45 (43-47)	35	<.001	16 (14-18)	14	>.05	63 (60-66)	28	<.001	3 (3-4)
	\$30,000-\$59,999	76 (73-79)	78	>.05	56 (53-60)	42	<.001	21 (17-25)	21	>.05	59 (54-64)	30	<.001	8 (6-10)
	\$60,000-\$89,999	78 (74-82)	89	<.001	60 (56-65)	56	>.05	23 (17-28)	21	>.05	61 (54-67)	37	<.001	11 (8-14)
	≥\$90,000	80 (76-85)	90	<.001	70 (65-74)	68	>.05	26 (20-32)	23	>.05	67 (60-73)	37	<.001	22 (18-26)
Education Level	No HS Diploma	55 (51-59)	65	<.001	33 (29-37)	21	<.001	-----	Not reported		54 (47-62)	17	<.001	2 (1-3)
	High School Graduate	69 (67-71)	75	<.001	42 (39-44)	36	<.001	14 (11-16)	11	.04	55 (51-58)	26	<.001	3 (3-4)
	Some College	83 (80-85)	85	.01	62 (60-65)	50	<.001	20 (17-24)	24	.02	62 (59-66)	33	<.001	9 (7-11)
	College+	78 (76-81)	86	<.001	63 (61-66)	61	>.05	24 (21-28)	22	>.05	65 (61-69)	38	<.001	15 (13-18)

Discussion

Principal Findings

While the conventional main focus of hospital EDs has been to provide immediate treatment to patients with acute conditions, the use of new media could extend the reach of the ED visit.

These clinical encounters provide unique and important opportunities to the clinicians and system of health care to positively influence individual health behavior beyond the emergency department setting.

We sought to define and differentiate new media from cell phone ownership to bring health care operationalization of electronic

devices consistent with the communication literature. Furthermore, because information technology is already playing an increasing role in improving health care, delivering interventions, navigating the health care system, and improving the public's health at large, we wanted to determine (beyond the anecdotal) that sufficient numbers of ED patients own and use new media. Survey participants' ownership of cell phones (4934/5788, 85.25%) and device usage for calling (4892/4934, 99.15%) and texting (3595/4935, 72.86%) were high. Among all cell phone owners, mobile phone ownership was moderate (2500/4934, 50.67%) with minorities reporting the highest rate of ownership. Benchmarked against the Pew-CHCF study [99], we observed similar prevalence figures for cell phone ownership and use for texting as well as mobile phone ownership (Table 3).

EDs are concerned with enhancing continuity of care throughout an entire health system and optimizing cost containment. As a result, they have generally heightened and expanded their attention to pre-hospital and post-discharge care implications of acute care. Finding new forms of effective communication facilitates expanding the scope of prevention, health promotion, health maintenance, and disease management services [100-102].

ED patients are segmented in this study to those most likely to own and use new media technology. Hence, we determined the characteristics of ED patients that own and use new media to tailor intervention strategies. Text messaging can be used to provide health information to most cell phone users (depending on their phone plan). We examined the relationship between ED patients' use of text messaging and individual patient characteristics. A higher prevalence of text messaging was reported by ED patients who were female, younger, nonwhite, and more educated (Table 2). Text messaging was less common among ED patients regardless of gender, age group, race/ethnicity, or socioeconomic status.

While mobile phone ownership is not as ubiquitous as overall cell phone ownership, mobile phone technology is important for behavioral interventions (eg, mobile phone health apps). Thus, we examined the relationship between ED patients' mobile phone ownership and individual patient characteristics. Participants who were female, younger, nonwhite, and had higher income reported greater ownership of mobile phone technology (Table 3). Notably, ED participants with lower household income, less formal education, and either urban or rural residency (data not shown) reported the highest ownership.

Female and younger ED patients who owned mobile phones, as well as those with greater educational attainment, reported higher online searching for health or medical information. Consistently, ED participants reported greater health information seeking than the general population as measured by Pew-CHCF.

We found similar patterns of usage of cell and mobile phones in both the ED patient population and the general population with the exception that ED patients are more likely to use desktop and laptop computers to seek health information than a mobile phone and the general population is more likely to rely on e-mail to communicate through a laptop or desktop computer.

Limitations

We compared the prevalence of health information seeking by ED patients with that of the general population. ED participants invariably reported greater health information seeking than participants in the Pew-CHCF survey. Individuals presenting to the emergency department likely have health conditions that trigger new media use to manage disease and seek information on treatment and care.

Racial/ethnic minorities and persons of lower socioeconomic status were overrepresented in the EDs as compared to the general US catchment area. Compared to the benchmark Pew-CHCF survey, our ED sample was similar in terms of gender but (predictably) was made up of more nonwhite participants who were poorer and had less schooling.

Conclusions

Our study formally defines new media and disambiguates cell phones from mobile phones. We established a scientifically derived baseline of new media use for ED patients and determined that a critical mass of patients use new media and would perhaps benefit from new media technology to manage their health and seek information. Most importantly, we found that more marginalized populations—such as the poor, homeless [48], and minority patients—do not differ significantly in ownership or usage rates from the general population and that sufficient ownership exists to reach a significant portion of the population using new media. New media may be a health care equalizer to address health care disparities by reaching minorities and low income patients better. This research also suggests that potentially assisting ED patients without information technology is an option to extend services such as the Lifeline Program for Low-Income Consumers [103]. This study increases confidence in the utility of new media for health care services, interventions, and follow up [61,104105].

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Conflicts of Interest

None declared.

References

1. Harris LM, editor. Health and the new media: technologies transforming personal and public health. Mahwah, NJ: L. Erlbaum Associates; 1995.

2. Brossard D, Scheufele DA. Social science. Science, new media, and the public. *Science* 2013 Jan 4;339(6115):40-41. [doi: [10.1126/science.1232329](https://doi.org/10.1126/science.1232329)] [Medline: [23288529](https://pubmed.ncbi.nlm.nih.gov/23288529/)]
3. Ohler J. *Digital storytelling in the classroom: new media pathways to literacy, learning, and creativity*. Thousand Oaks, CA: Corwin; 2013.
4. Bassnett S. *Translation: The new critical idiom*. New York: Routledge; 2013.
5. Della LJ, Eroglu D, Bernhardt JM, Edgerton E, Nall J. Looking to the future of new media in health marketing: deriving propositions based on traditional theories. *Health Mark Q* 2008;25(1-2):147-174. [doi: [10.1080/07359680802126210](https://doi.org/10.1080/07359680802126210)] [Medline: [18935883](https://pubmed.ncbi.nlm.nih.gov/18935883/)]
6. O'Keeffe GS. Overview: new media. *Pediatr Clin North Am* 2012 Jun;59(3):589-600, vii. [doi: [10.1016/j.pcl.2012.03.024](https://doi.org/10.1016/j.pcl.2012.03.024)] [Medline: [22643166](https://pubmed.ncbi.nlm.nih.gov/22643166/)]
7. Buckingham D, Willett R, editors. *Digital generations: children, young people, and new media*. Mahwah, N.J: Lawrence Erlbaum Associates, Publishers; 2006.
8. Hirst M, Harrison J, Mazepa P. *Communication and new media: From broadcast to narrowcast*. Ontario, Canada: Oxford University Press; 2014.
9. Dodge HH, Ybarra O, Kaye JA. Tools for advancing research into social networks and cognitive function in older adults. *Int Psychogeriatr* 2014 Apr;26(4):533-539 [FREE Full text] [doi: [10.1017/S1041610213001750](https://doi.org/10.1017/S1041610213001750)] [Medline: [24152936](https://pubmed.ncbi.nlm.nih.gov/24152936/)]
10. Gitlow L. Technology Use by Older Adults and Barriers to Using Technology. *Phys Occup Ther Geriatr* 2014 Sep;32(3):271-280. [doi: [10.3109/02703181.2014.946640](https://doi.org/10.3109/02703181.2014.946640)]
11. Shah N, Jonassaint J, De CL. Patients welcome the Sick Cell Disease Mobile Application to Record Symptoms via Technology (SMART). *Hemoglobin* 2014;38(2):99-103. [doi: [10.3109/03630269.2014.880716](https://doi.org/10.3109/03630269.2014.880716)] [Medline: [24512633](https://pubmed.ncbi.nlm.nih.gov/24512633/)]
12. Shafiq M, Iqbal M, Choi JG, Rafi Z, Ahmad M, Ali W, et al. To What Extent System Usability Effects User Satisfaction: A Case Study of Smart Phone Features Analysis for Learning of Novice. In: Marcus A, editor. *Design, User Experience, and Usability. User Experience Design for Diverse Interaction Platforms and Environments*. Cham, Switzerland: Springer; 2014:346-357.
13. Malinowsky C, Nygård L, Kottorp A. Using a screening tool to evaluate potential use of e-health services for older people with and without cognitive impairment. *Aging Ment Health* 2014;18(3):340-345. [doi: [10.1080/13607863.2013.832731](https://doi.org/10.1080/13607863.2013.832731)] [Medline: [24548108](https://pubmed.ncbi.nlm.nih.gov/24548108/)]
14. Petrovčič A, Fortunati L, Vehovar V, Kavčič M, Dolničar V. Mobile phone communication in social support networks of older adults in Slovenia. *Telematics and Informatics* 2015 Nov;32(4):642-655. [doi: [10.1016/j.tele.2015.02.005](https://doi.org/10.1016/j.tele.2015.02.005)]
15. Wang P. Is a multi-touch gesture interface based on a tablet better than a smart-phone for elderly users?. Auckland, New Zealand: Auckland University of Technology; 2014. URL: <http://aut.researchgateway.ac.nz/handle/10292/7655> [accessed 2015-06-20] [WebCite Cache ID 6ZQmGnJ0P]
16. Christakis DA, Frintner MP, Mulligan DA, Fuld GL, Olson LM. Media education in pediatric residencies: a national survey. *Acad Pediatr* 2013;13(1):55-58. [doi: [10.1016/j.acap.2012.10.003](https://doi.org/10.1016/j.acap.2012.10.003)] [Medline: [23312857](https://pubmed.ncbi.nlm.nih.gov/23312857/)]
17. Nagel J. Abstracts from the NIH Office of Research on Women's Health Tenth Annual Interdisciplinary Women's Health Research Symposium October 24, 2013. *Journal of Women's Health* 2013 Oct;22(10):879-908. [doi: [10.1089/jwh.2013.ab02](https://doi.org/10.1089/jwh.2013.ab02)] [Medline: [3791437](https://pubmed.ncbi.nlm.nih.gov/3791437/)]
18. Moorhead S, Hazlett D, Harrison L, Carroll J, Irwin A, Hoving C. A new dimension of health care: systematic review of the uses, benefits, and limitations of social media for health communication. *J Med Internet Res* 2013;15(4):e85 [FREE Full text] [doi: [10.2196/jmir.1933](https://doi.org/10.2196/jmir.1933)] [Medline: [23615206](https://pubmed.ncbi.nlm.nih.gov/23615206/)]
19. Jensen KB, editor. *A handbook of media and communications research: qualitative and quantitative methodologies*. London: Routledge; 2002.
20. Pavlik JV. Trends in new media research: A critical review of recent scholarship. *Sociology Compass* 2013;7(1):1-12. [doi: [10.1111/soc4.12004](https://doi.org/10.1111/soc4.12004)]
21. Pooley J, Socolow MJ. War of the worlds: The 'Invasion from Mars' and its legacy for mass communication scholarship. In: Hayes JE, Battles K, Hilton-Morrow W, editors. *War of the Worlds to social media: Mediated communication in time of crisis*. New York: Peter Lang Publishing; 2013:35-56.
22. Allgaier J, Dunwoody S, Brossard D, Lo YY, Peters HP. Journalism and social media as means of observing the contexts of science. *BioScience* 2013;63(4):284-287.
23. Logsdon MC, Bennett G, Crutzen R, Martin L, Eckert D, Robertson A, et al. Preferred health resources and use of social media to obtain health and depression information by adolescent mothers. *J Child Adolesc Psychiatr Nurs* 2014 Nov;27(4):163-168. [doi: [10.1111/jcap.12083](https://doi.org/10.1111/jcap.12083)] [Medline: [25100157](https://pubmed.ncbi.nlm.nih.gov/25100157/)]
24. Jenkins H. *Convergence culture: where old and new media collide*. New York: New York University Press; 2008.
25. Bernhardt JM, Chaney JD, Chaney BH, Hall AK. New media for health education: a revolution in progress. *Health Educ Behav* 2013 Apr;40(2):129-132. [doi: [10.1177/1090198113483140](https://doi.org/10.1177/1090198113483140)] [Medline: [23548787](https://pubmed.ncbi.nlm.nih.gov/23548787/)]
26. Prainsack B. The powers of participatory medicine. *PLoS Biol* 2014 Apr;12(4):e1001837 [FREE Full text] [doi: [10.1371/journal.pbio.1001837](https://doi.org/10.1371/journal.pbio.1001837)] [Medline: [24736935](https://pubmed.ncbi.nlm.nih.gov/24736935/)]

27. Finkelstein SR, Liu N, Jani B, Rosenthal D, Poghosyan L. Appointment reminder systems and patient preferences: Patient technology usage and familiarity with other service providers as predictive variables. *Health Informatics J* 2013 Jun;19(2):79-90. [doi: [10.1177/1460458212458429](https://doi.org/10.1177/1460458212458429)] [Medline: [23715208](https://pubmed.ncbi.nlm.nih.gov/23715208/)]
28. Lyles CR, Sarkar U, Ralston JD, Adler N, Schillinger D, Moffet HH, et al. Patient-provider communication and trust in relation to use of an online patient portal among diabetes patients: The Diabetes and Aging Study. *J Am Med Inform Assoc* 2013;20(6):1128-1131 [FREE Full text] [doi: [10.1136/amiajnl-2012-001567](https://doi.org/10.1136/amiajnl-2012-001567)] [Medline: [23676243](https://pubmed.ncbi.nlm.nih.gov/23676243/)]
29. Dubey D, Amritphale A, Sawhney A, Amritphale N, Dubey P, Pandey A. Smart phone applications as a source of information on stroke. *J Stroke* 2014 May;16(2):86-90 [FREE Full text] [doi: [10.5853/jos.2014.16.2.86](https://doi.org/10.5853/jos.2014.16.2.86)] [Medline: [24949314](https://pubmed.ncbi.nlm.nih.gov/24949314/)]
30. Buhi ER, Trudnak TE, Martinasek MP, Oberne AB, Fuhrmann HJ, McDermott RJ. Mobile phone-based behavioural interventions for health: A systematic review. *Health Education Journal* 2012 Jul 10;72(5):564-583. [doi: [10.1177/0017896912452071](https://doi.org/10.1177/0017896912452071)]
31. Lindén M, Folke M. Pedometer Cell Phone Applications and Future Trends in Measuring Physical Activity. *Information Systems and Technologies for Enhancing Health and Social Care* 2013:324.
32. Fowler FJ. *Survey research methods*. Thousand Oaks, CA: Sage; 2014.
33. Thompson HS, Shelton RC, Mitchell J, Eaton T, Valera P, Katz A. Inclusion of underserved racial and ethnic groups in cancer intervention research using new media: A systematic literature review. *J Natl Cancer Inst Monogr* 2013;47:216-223. [doi: [10.1093/jncimonographs/igt031](https://doi.org/10.1093/jncimonographs/igt031)]
34. Buhi ER, Klinkenberger N, Hughes S, Blunt HD, Rietmeijer C. Teens' use of digital technologies and preferences for receiving STD prevention and sexual health promotion messages: implications for the next generation of intervention initiatives. *Sex Transm Dis* 2013 Jan;40(1):52-54. [doi: [10.1097/OLQ.0b013e318264914a](https://doi.org/10.1097/OLQ.0b013e318264914a)] [Medline: [23250302](https://pubmed.ncbi.nlm.nih.gov/23250302/)]
35. Knijnenburg SL, Kremer LC, Versluys AB, Braam KI, Mud MS, van der Pal HJH, et al. Evaluation of a patient information website for childhood cancer survivors. *Support Care Cancer* 2013 Apr;21(4):919-926. [doi: [10.1007/s00520-012-1604-7](https://doi.org/10.1007/s00520-012-1604-7)] [Medline: [23007883](https://pubmed.ncbi.nlm.nih.gov/23007883/)]
36. Snyder CF, Blackford AL, Wolff AC, Carducci MA, Herman JM, Wu AW, PatientViewpoint Scientific Advisory Board. Feasibility and value of PatientViewpoint: a web system for patient-reported outcomes assessment in clinical practice. *Psychooncology* 2013 Apr;22(4):895-901 [FREE Full text] [doi: [10.1002/pon.3087](https://doi.org/10.1002/pon.3087)] [Medline: [22544513](https://pubmed.ncbi.nlm.nih.gov/22544513/)]
37. Xiao N, Sharman R, Rao H, Upadhyaya S. Factors influencing online health information search: An empirical analysis of a national cancer-related survey. *Decision Support Systems* 2014 Jan;57:417-427. [doi: [10.1016/j.dss.2012.10.047](https://doi.org/10.1016/j.dss.2012.10.047)]
38. Audet A, Squires D, Doty MM. Where are we on the diffusion curve? Trends and drivers of primary care physicians' use of health information technology. *Health Serv Res* 2014 Feb;49(1 Pt 2):347-360 [FREE Full text] [doi: [10.1111/1475-6773.12139](https://doi.org/10.1111/1475-6773.12139)] [Medline: [24358958](https://pubmed.ncbi.nlm.nih.gov/24358958/)]
39. Chen Y, Cheng K, Tang C, Siek KA, Bardram JE. Is my doctor listening to me? Impact of health IT systems on patient-provider interaction. In: *CHI '13 Extended Abstracts on Human Factors in Computing Systems*. 2013 Presented at: CHI EA '13; 2013; Paris, France p. 2419-2426. [doi: [10.1145/2468356.2468791](https://doi.org/10.1145/2468356.2468791)]
40. Jones SS, Rudin RS, Perry T, Shekelle PG. Health information technology: an updated systematic review with a focus on meaningful use. *Ann Intern Med* 2014 Jan 7;160(1):48-54. [doi: [10.7326/M13-1531](https://doi.org/10.7326/M13-1531)] [Medline: [24573664](https://pubmed.ncbi.nlm.nih.gov/24573664/)]
41. Falah J, Harrison D, Charissis V, Wood B. The characterisation of a virtual reality system to improve the quality and to reduce the gap between information technology and medical education. In: Shumaker R, editor. *Virtual, augmented and mixed reality: Systems and applications*. Heidelberg, Germany: Springer; 2013:122-131.
42. Gorlick A, Bantum EO, Owen JE. Internet-based interventions for cancer-related distress: exploring the experiences of those whose needs are not met. *Psychooncology* 2014 Apr;23(4):452-458 [FREE Full text] [doi: [10.1002/pon.3443](https://doi.org/10.1002/pon.3443)] [Medline: [24243756](https://pubmed.ncbi.nlm.nih.gov/24243756/)]
43. Stephen J, Collie K, McLeod D, Rojubbally A, Fergus K, Specca M, et al. Talking with text: communication in therapist-led, live chat cancer support groups. *Soc Sci Med* 2014 Mar;104:178-186. [doi: [10.1016/j.socscimed.2013.12.001](https://doi.org/10.1016/j.socscimed.2013.12.001)] [Medline: [24581076](https://pubmed.ncbi.nlm.nih.gov/24581076/)]
44. Maloney EK, D'Agostino TA, Heerdt A, Dickler M, Li Y, Ostroff JS, et al. Sources and types of online information that breast cancer patients read and discuss with their doctors. *Palliat Support Care* 2015 Apr;13(2):107-114. [doi: [10.1017/S1478951513000862](https://doi.org/10.1017/S1478951513000862)] [Medline: [24182945](https://pubmed.ncbi.nlm.nih.gov/24182945/)]
45. Morris BA, Lepore SJ, Wilson B, Lieberman MA, Dunn J, Chambers SK. Adopting a survivor identity after cancer in a peer support context. *J Cancer Surviv* 2014 Sep;8(3):427-436. [doi: [10.1007/s11764-014-0355-5](https://doi.org/10.1007/s11764-014-0355-5)] [Medline: [24706364](https://pubmed.ncbi.nlm.nih.gov/24706364/)]
46. Lockwood MB, Saunders MR, Lee CS, Becker YT, Josephson MA, Chon WJ. Kidney transplant and the digital divide: is information and communication technology a barrier or a bridge to transplant for African Americans? *Prog Transplant* 2013 Dec;23(4):302-309. [doi: [10.7182/pit2013869](https://doi.org/10.7182/pit2013869)] [Medline: [24311393](https://pubmed.ncbi.nlm.nih.gov/24311393/)]
47. Zulman DM, Piette JD, Jenchura EC, Asch SM, Rosland AM. Facilitating out-of-home caregiving through health information technology: survey of informal caregivers' current practices, interests, and perceived barriers. *J Med Internet Res* 2013;15(7):e123 [FREE Full text] [doi: [10.2196/jmir.2472](https://doi.org/10.2196/jmir.2472)] [Medline: [23841987](https://pubmed.ncbi.nlm.nih.gov/23841987/)]
48. Post LA, Vaca FE, Doran KM, Luco C, Naftilan M, Dziura J, et al. New media use by patients who are homeless: the potential of mHealth to build connectivity. *J Med Internet Res* 2013;15(9):e195 [FREE Full text] [doi: [10.2196/jmir.2724](https://doi.org/10.2196/jmir.2724)] [Medline: [24001876](https://pubmed.ncbi.nlm.nih.gov/24001876/)]

49. Miller CW, Himelhoch S. Acceptability of Mobile Phone Technology for Medication Adherence Interventions among HIV-Positive Patients at an Urban Clinic. *AIDS Res Treat* 2013;2013:670525 [FREE Full text] [doi: [10.1155/2013/670525](https://doi.org/10.1155/2013/670525)] [Medline: [23997948](https://pubmed.ncbi.nlm.nih.gov/23997948/)]
50. Dayer L, Heldenbrand S, Anderson P, Gubbins PO, Martin BC. Smartphone medication adherence apps: potential benefits to patients and providers. *J Am Pharm Assoc (2003)* 2013;53(2):172-181 [FREE Full text] [doi: [10.1331/JAPhA.2013.12202](https://doi.org/10.1331/JAPhA.2013.12202)] [Medline: [23571625](https://pubmed.ncbi.nlm.nih.gov/23571625/)]
51. Stawarz K, Cox AL, Blandford A. Don't forget your pill! Designing effective medication reminder apps that support users' daily routines. In: *Proceedings of the SIGCHI Conference on Human Factors in Computing Systems*. 2014 Presented at: CHI 2014; Apr 26-May 1, 2014; Toronto, Ontario, Canada p. 2269-2278. [doi: [10.1145/2556288.2557079](https://doi.org/10.1145/2556288.2557079)]
52. Sacristán JA. Patient-centered medicine and patient-oriented research: improving health outcomes for individual patients. *BMC Med Inform Decis Mak* 2013;13:6 [FREE Full text] [doi: [10.1186/1472-6947-13-6](https://doi.org/10.1186/1472-6947-13-6)] [Medline: [23294526](https://pubmed.ncbi.nlm.nih.gov/23294526/)]
53. Bauer AM, Thielke SM, Katon W, Unützer J, Areán P. Aligning health information technologies with effective service delivery models to improve chronic disease care. *Prev Med* 2014 Sep;66:167-172. [doi: [10.1016/j.ypmed.2014.06.017](https://doi.org/10.1016/j.ypmed.2014.06.017)] [Medline: [24963895](https://pubmed.ncbi.nlm.nih.gov/24963895/)]
54. Kravitz RL, Franks P, Feldman MD, Tancredi DJ, Slee CA, Epstein RM, et al. Patient engagement programs for recognition and initial treatment of depression in primary care: a randomized trial. *JAMA* 2013 Nov 6;310(17):1818-1828. [doi: [10.1001/jama.2013.280038](https://doi.org/10.1001/jama.2013.280038)] [Medline: [24193079](https://pubmed.ncbi.nlm.nih.gov/24193079/)]
55. Ricciardi L, Mostashari F, Murphy J, Daniel JG, Siminerio EP. A national action plan to support consumer engagement via e-health. *Health Aff (Millwood)* 2013 Feb;32(2):376-384. [doi: [10.1377/hlthaff.2012.1216](https://doi.org/10.1377/hlthaff.2012.1216)] [Medline: [23381531](https://pubmed.ncbi.nlm.nih.gov/23381531/)]
56. Hibbard JH, Greene J. What the evidence shows about patient activation: better health outcomes and care experiences; fewer data on costs. *Health Aff (Millwood)* 2013 Feb;32(2):207-214. [doi: [10.1377/hlthaff.2012.1061](https://doi.org/10.1377/hlthaff.2012.1061)] [Medline: [23381511](https://pubmed.ncbi.nlm.nih.gov/23381511/)]
57. Manary MP, Boulding W, Staelin R, Glickman SW. The patient experience and health outcomes. *N Engl J Med* 2013 Jan 17;368(3):201-203. [doi: [10.1056/NEJMp1211775](https://doi.org/10.1056/NEJMp1211775)] [Medline: [23268647](https://pubmed.ncbi.nlm.nih.gov/23268647/)]
58. Cosgrove DM, Fisher M, Gabow P, Gottlieb G, Halvorson GC, James BC, et al. Ten strategies to lower costs, improve quality, and engage patients: the view from leading health system CEOs. *Health Aff (Millwood)* 2013 Feb;32(2):321-327. [doi: [10.1377/hlthaff.2012.1074](https://doi.org/10.1377/hlthaff.2012.1074)] [Medline: [23381525](https://pubmed.ncbi.nlm.nih.gov/23381525/)]
59. Kotler P, Armstrong G. *Principles of marketing*. Boston, MA: Prentice Hall; 2013.
60. Bond MC, Klemm R, Merlis J, Kopinski JE, Hirshon JM. Computer access and Internet use by urban and suburban emergency department customers. *J Emerg Med* 2012 Jul;43(1):159-165. [doi: [10.1016/j.jemermed.2011.03.034](https://doi.org/10.1016/j.jemermed.2011.03.034)] [Medline: [22142670](https://pubmed.ncbi.nlm.nih.gov/22142670/)]
61. Kwon NS, Colucci A, Gulati R, Shawn L, Kasahara Y, El BA, et al. A survey of the prevalence of cell phones capable of receiving health information among patients presenting to an Urban Emergency Department. *J Emerg Med* 2013 Apr;44(4):875-888. [doi: [10.1016/j.jemermed.2012.09.041](https://doi.org/10.1016/j.jemermed.2012.09.041)] [Medline: [23321292](https://pubmed.ncbi.nlm.nih.gov/23321292/)]
62. Choo EK, Ranney ML, Aggarwal N, Boudreaux ED. A systematic review of emergency department technology-based behavioral health interventions. *Acad Emerg Med* 2012 Mar;19(3):318-328. [doi: [10.1111/j.1553-2712.2012.01299.x](https://doi.org/10.1111/j.1553-2712.2012.01299.x)] [Medline: [22435865](https://pubmed.ncbi.nlm.nih.gov/22435865/)]
63. Saidinejad M, Teach SJ, Chamberlain JM. Internet access and electronic communication among families in an urban pediatric emergency department. *Pediatr Emerg Care* 2012 Jun;28(6):553-557. [doi: [10.1097/PEC.0b013e318258ad76](https://doi.org/10.1097/PEC.0b013e318258ad76)] [Medline: [22653452](https://pubmed.ncbi.nlm.nih.gov/22653452/)]
64. Johnson TP, Wislar JS. Response rates and nonresponse errors in surveys. *JAMA* 2012 May 2;307(17):1805-1806. [doi: [10.1001/jama.2012.3532](https://doi.org/10.1001/jama.2012.3532)] [Medline: [22550194](https://pubmed.ncbi.nlm.nih.gov/22550194/)]
65. Monette DR, Sullivan TJ, DeJong CR, Hilton TP. *Applied social research: A tool for the human services*. Belmont, CA: Brooks/Cole; 2013.
66. Ranney ML, Choo EK, Wang Y, Baum A, Clark MA, Mello MJ. Emergency department patients' preferences for technology-based behavioral interventions. *Ann Emerg Med* 2012 Aug;60(2):218-27.e48. [doi: [10.1016/j.annemergmed.2012.02.026](https://doi.org/10.1016/j.annemergmed.2012.02.026)] [Medline: [22542311](https://pubmed.ncbi.nlm.nih.gov/22542311/)]
67. O'Toole TP, Buckel L, Bourgault C, Blumen J, Redihan SG, Jiang L, et al. Applying the chronic care model to homeless veterans: effect of a population approach to primary care on utilization and clinical outcomes. *Am J Public Health* 2010 Dec;100(12):2493-2499. [doi: [10.2105/AJPH.2009.179416](https://doi.org/10.2105/AJPH.2009.179416)] [Medline: [20966377](https://pubmed.ncbi.nlm.nih.gov/20966377/)]
68. Kim S, Jang Y, Mellema A, Ebert DS, Collins T. Visual analytics on mobile devices for emergency response. 2007 Presented at: *IEEE Symposium on Visual Analytics Science and Technology*; Oct 30-Nov 1, 2007; Sacramento, CA p. 35-42. [doi: [10.1109/VAST.2007.4388994](https://doi.org/10.1109/VAST.2007.4388994)]
69. de Zuniga HG, Jung N, Valenzuela S. Social media use for news and individuals' social capital, civic engagement and political participation. *Journal of Computer - Mediated Communication* 2012;17(3):319-336. [doi: [10.1111/j.1083-6101.2012.01574.x](https://doi.org/10.1111/j.1083-6101.2012.01574.x)]
70. Cheston CC, Flickinger TE, Chisolm MS. Social media use in medical education: a systematic review. *Acad Med* 2013 Jun;88(6):893-901. [doi: [10.1097/ACM.0b013e31828ffc23](https://doi.org/10.1097/ACM.0b013e31828ffc23)] [Medline: [23619071](https://pubmed.ncbi.nlm.nih.gov/23619071/)]
71. D'Onofrio G, Degutis LC. Preventive care in the emergency department: screening and brief intervention for alcohol problems in the emergency department: a systematic review. *Acad Emerg Med* 2002 Jun;9(6):627-638. [Medline: [12045080](https://pubmed.ncbi.nlm.nih.gov/12045080/)]

72. D'Onofrio G, Degutis LC. Screening and brief intervention in the emergency department. *Alcohol Res Health* 2004;28(2):63-72. [Medline: [19006993](#)]
73. Bernstein SL, Boudreaux ED, Cydulka RK, Rhodes KV, Lettman NA, Almeida S, American College of Emergency Physicians Task Force on Smoking Cessation. Tobacco control interventions in the emergency department: a joint statement of emergency medicine organizations. *Ann Emerg Med* 2006 Oct;48(4):e417-e426. [doi: [10.1016/j.annemergmed.2006.02.018](#)] [Medline: [16997678](#)]
74. Cunningham RM, Bernstein SL, Walton M, Broderick K, Vaca FE, Woolard R, et al. Alcohol, tobacco, and other drugs: future directions for screening and intervention in the emergency department. *Acad Emerg Med* 2009 Nov;16(11):1078-1088. [doi: [10.1111/j.1553-2712.2009.00552.x](#)] [Medline: [20053226](#)]
75. Schiamberg LB, Oehmke J, Zhang Z, Barboza GE, Griffiore RJ, Von HL, et al. Physical abuse of older adults in nursing homes: a random sample survey of adults with an elderly family member in a nursing home. *J Elder Abuse Negl* 2012;24(1):65-83. [doi: [10.1080/08946566.2011.608056](#)] [Medline: [22206513](#)]
76. Post L, Page C, Conner T, Prokhorov A, Fang Y, Biroscak BJ. Elder Abuse in Long-Term Care: Types, Patterns, and Risk Factors. *Research on Aging* 2010 Apr 20;32(3):323-348. [doi: [10.1177/0164027509357705](#)]
77. Zhang Z, Schiamberg LB, Oehmke J, Barboza GE, Griffiore RJ, Post LA, et al. Neglect of older adults in Michigan nursing homes. *Journal of Elder Abuse & Neglect* 2010;23(1):58-74. [doi: [10.1080/08946566.2011.534708](#)]
78. Conner T, Prokhorov A, Page C, Fang Y, Xiao Y, Post LA. Impairment and abuse of elderly by staff in long-term care in Michigan: evidence from structural equation modeling. *J Interpers Violence* 2011 Jan;26(1):21-33. [doi: [10.1177/0886260510362880](#)] [Medline: [20448233](#)]
79. Page C, Conner T, Prokhorov A, Fang Y, Post L. The effect of care setting on elder abuse: results from a Michigan survey. *J Elder Abuse Negl* 2009;21(3):239-252. [doi: [10.1080/08946560902997553](#)] [Medline: [19827327](#)]
80. Parra-Cardona JR, Meyer E, Schiamberg L, Post L. Elder abuse and neglect in Latino families: an ecological and culturally relevant theoretical framework for clinical practice. *Fam Process* 2007 Dec;46(4):451-470. [Medline: [18092579](#)]
81. Post LA, Swierenga SJ, Oehmke J, Salmon C, Prokhorov A, Meyer E, et al. The implications of an aging population structure. *The International Journal of Interdisciplinary Social Sciences* 2006;1(2):47-58.
82. Shimada SL, Brandt CA, Feng H, McInnes DK, Rao SR, Rothendler JA, et al. Personal health record reach in the Veterans Health Administration: a cross-sectional analysis. *J Med Internet Res* 2014;16(12):e272 [FREE Full text] [doi: [10.2196/jmir.3751](#)] [Medline: [25498515](#)]
83. Haskell SG, Gordon KS, Mattocks K, Duggal M, Erdos J, Justice A, et al. Gender differences in rates of depression, PTSD, pain, obesity, and military sexual trauma among Connecticut War Veterans of Iraq and Afghanistan. *J Womens Health (Larchmt)* 2010 Feb;19(2):267-271 [FREE Full text] [doi: [10.1089/jwh.2008.1262](#)] [Medline: [20109115](#)]
84. Lotfipour S, Cisneros V, Chakravarthy B, Barrios C, Anderson CL, Fox JC, et al. Assessment of readiness to change and relationship to AUDIT score in a trauma population utilizing computerized alcohol screening and brief intervention. *Subst Abuse* 2012;33(4):378-386 [FREE Full text] [doi: [10.1080/08897077.2011.645951](#)] [Medline: [22989282](#)]
85. Vaca F, Anderson CL. U.S. motor vehicle fatality trends in young Latino males. *Ann Adv Automot Med* 2009 Oct;53:77-82 [FREE Full text] [Medline: [20184834](#)]
86. Vaca FE, Anderson CL, Hayes-Bautista DE. The Latino adolescent male mortality peak revisited: attribution of homicide and motor vehicle crash death. *Inj Prev* 2011 Apr;17(2):102-107 [FREE Full text] [doi: [10.1136/ip.2010.028886](#)] [Medline: [21134905](#)]
87. Dziura JD, Post LA, Zhao Q, Fu Z, Peduzzi P. Strategies for dealing with missing data in clinical trials: from design to analysis. *Yale J Biol Med* 2013 Sep;86(3):343-358 [FREE Full text] [Medline: [24058309](#)]
88. Joenssen DW, Bankhofer U. Donor limited hot deck imputation: effects on parameter estimation. *Journal of Theoretical and Applied Computer Science* 2012;6(3):58-70.
89. Marinelli M, Alvarez NP, Melis GG, Universitat Politècnica de Catalunya. Departament d'Estadística i Investigació Operativa. Missing Data in Clinical Trials. Barcelona, Spain: Universitat Politècnica de Catalunya. Facultat de Matemàtiques i Estadística. Departament d'Estadística i Investigació Operativa, 2011 (Màster en Estadística i Investigació Operativa (UPC-UB)); 2011.
90. Rousseau M. Missing data: issues and treatments. In: Simon M, Ercikan K, Rousseau M, editors. Improving large-scale assessment in education: theory, issues, and practice. New York: Routledge; 2013:260-275.
91. Cheema JR. A Review of Missing Data Handling Methods in Education Research. *Review of Educational Research* 2014 Apr 22;84(4):487-508. [doi: [10.3102/0034654314532697](#)]
92. Twisk J, de Boer M, de Vente W, Heymans M. Multiple imputation of missing values was not necessary before performing a longitudinal mixed-model analysis. *J Clin Epidemiol* 2013 Sep;66(9):1022-1028. [doi: [10.1016/j.jclinepi.2013.03.017](#)] [Medline: [23790725](#)]
93. Mayer B. Hot Deck Propensity Score Imputation For Missing Values. *Science Journal of Medicine and Clinical Trials* 2013;2013. [doi: [10.7237/sjmct/248](#)]
94. Allison P. Missing data. Thousand Oaks, Calif: Sage Publications; 2002.
95. Cranmer SJ, Gill J. We Have to Be Discrete About This: A Non-Parametric Imputation Technique for Missing Categorical Data. *Brit. J. Polit. Sci* 2012 Jul 19;43(02):425-449. [doi: [10.1017/S0007123412000312](#)]

96. Kim HJ, Reiter JP, Wang Q, Cox LH, Karr AF. Multiple Imputation of Missing or Faulty Values Under Linear Constraints. *Journal of Business & Economic Statistics* 2014 Jul 28;32(3):375-386. [doi: [10.1080/07350015.2014.885435](https://doi.org/10.1080/07350015.2014.885435)]
97. Manski CF. The National Bureau of Economic Research. 2014. Communicating Uncertainty in Official Economic Statistics URL: <http://www.nber.org/papers/w20098.pdf> [accessed 2015-06-21] [WebCite Cache ID 6ZS0AFakh]
98. Cox BE, McIntosh K, Reason RD, Terenzini PT. Working with Missing Data in Higher Education Research: A Primer and Real-World Example. *The Review of Higher Education* 2014;37(3):377-402.
99. Fox S, Duggan M. Pew Internet & American Life Project. 2012 Nov 8. Mobile Health 2012 URL: http://www.pewinternet.org/files/old-media/Files/Reports/2012/PIP_MobileHealth2012_FINAL.pdf [accessed 2015-06-21] [WebCite Cache ID 6ZS0Zvsqx]
100. Sikka N, Carlin KN, Pines J, Pirri M, Strauss R, Rahimi F. The use of mobile phones for acute wound care: attitudes and opinions of emergency department patients. *J Health Commun* 2012;17 Suppl 1:37-42; quiz 42. [doi: [10.1080/10810730.2011.649161](https://doi.org/10.1080/10810730.2011.649161)] [Medline: [22548597](https://pubmed.ncbi.nlm.nih.gov/22548597/)]
101. Vardoulakis LP, Karlson A, Morris D, Smith G, Gatewood J, Tan D. Using Mobile Phones to Present Medical Information to Hospital Patients. In: CHI '12 Proceedings of the SIGCHI Conference on Human Factors in Computing Systems. 2012 Presented at: CHI '12; May 5-10; Austin, TX p. 1411-1420. [doi: [10.1145/2207676.2208601](https://doi.org/10.1145/2207676.2208601)]
102. Vawdrey DK, Wilcox LG, Collins SA, Bakken S, Feiner S, Boyer A, et al. A tablet computer application for patients to participate in their hospital care. *AMIA Annu Symp Proc* 2011 Oct 22:1428-1435. [Medline: [PMC3243172](https://pubmed.ncbi.nlm.nih.gov/PMC3243172/)]
103. Federal Communications Commission. FCC Encyclopedia. 2014. Lifeline Program for Low-Income Consumers URL: <https://www.fcc.gov/lifeline> [accessed 2015-06-21] [WebCite Cache ID 6ZS1jwge7]
104. Zhu H, Sencan I, Wong J, Dimitrov S, Tseng D, Nagashima K, et al. Cost-effective and rapid blood analysis on a cell-phone. *Lab Chip* 2013 Apr 7;13(7):1282-1288 [FREE Full text] [doi: [10.1039/c3lc41408f](https://doi.org/10.1039/c3lc41408f)] [Medline: [23392286](https://pubmed.ncbi.nlm.nih.gov/23392286/)]
105. Price M, Ruggiero KJ, Ferguson PL, Patel SK, Treiber F, Couillard D, et al. A feasibility pilot study on the use of text messages to track PTSD symptoms after a traumatic injury. *Gen Hosp Psychiatry* 2014;36(3):249-254 [FREE Full text] [doi: [10.1016/j.genhosppsych.2014.02.004](https://doi.org/10.1016/j.genhosppsych.2014.02.004)] [Medline: [24636721](https://pubmed.ncbi.nlm.nih.gov/24636721/)]

Abbreviations

- ED:** emergency department
- CHCF:** California HealthCare Foundation
- CI:** confidence interval
- RA:** research assistant
- YNHHS:** Yale-New Haven Health System

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