

## **Smartphone Use to Answer Clinical Questions: A Descriptive Study of APNs**

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**ABSTRACT.** This study examines the use of smartphones by Alabama Advanced Practice Nurses (APNs) to find information to address clinical questions and seeks to describe the types of questions answered using smartphones; barriers to information seeking; apps and online resources perceived as most helpful; and training/resource needs. Information collected in this study can be used by libraries that serve nursing students to develop training and resources to assist both nursing students and practicing nurses to become more efficient and effective information seekers.

**KEYWORDS.** Advanced Practice Nurses, APNs, information seeking, mobile apps, nurse practitioners, smartphones

Shortened Title: Smartphone Use to Answer Clinical Questions

## ***INTRODUCTION***

Today's health care environment includes an increasing emphasis on evidence based practice (EPB), which seeks to have health care providers integrate best research evidence, clinical experience, and patient preference to make patient care decisions. EBP requires Advanced Practice Nurses (APNs) to seek out, analyze, and apply research evidence to questions that arise in clinical practice. Numerous studies have sought to discover how different types of health care professionals seek information at the point of care; however, although there has been a tremendous increase in the use of cell phones with Internet capability, few studies have surveyed the use of these "smartphones" to find evidence and even fewer focus on use by APNs. This study examines the use of smartphones by Alabama APNs to address clinical questions and seeks to describe the types of questions answered using smartphones; barriers to information seeking; apps and online resources perceived as most helpful; and training/resource needs. Libraries that serve nursing students can use the information collected in this study to develop training and resources to assist both nursing students and practicing nurses to become more efficient and effective information seekers.

## ***LITERATURE REVIEW***

The study of information needs and information seeking by APNs in general has been undertaken in multiple studies.<sup>1-4</sup> Focused studies have been done on the types of information sought,<sup>5</sup> barriers to information seeking,<sup>6</sup> and the effect of practice population on information needs and access.<sup>7</sup> More recent research is often concerned with mode of access to electronic information. Several projects since 2006 have examined the use of PDAs (personal digital assistants) by nurses to access information; results indicate that nurses are using PDAs in clinical settings<sup>8,9</sup> and their use has the potential to increase access to information at the point of care.<sup>10-14</sup>

However, a 2011 report by the Consumer Electronics Industry states that most PDAs have been replaced by smartphones.<sup>15</sup> As of January 2014, the Pew Research Internet Project reports that 69% of American college graduates own smartphones,<sup>16</sup> while Siewiorek suggests that the smartphone of the near future will be a “constant companion, coach, collaborator, and advisor.”<sup>17</sup> Smartphones are already viewed by some as a convenient way to provide access to clinical information,<sup>18-21</sup> although little research has been done on smartphone use by nurses with the exception of one study in nursing students<sup>22</sup> and a study of health care professionals that included nurses.<sup>23</sup> Additional research has focused specifically on smartphone use by physicians, residents, and graduate students. Leon et al. concluded that smartphones provided real time mobile access to medical literature, which was perceived to be useful for patient care.<sup>24</sup> Boruff and Storie found that medical students, residents, clinical instructors, and faculty were using mobile devices to answer clinical questions, but perhaps not always using the most appropriate resources.<sup>25</sup>

The purpose of this study was to survey Advanced Practice Nurses about their use of smartphones to seek clinical information. Research questions included:

- What types of clinical questions are answered using smartphones?
- Are there barriers to information seeking with smartphones?
- What phone apps and online resources do APNs find most useful in clinical situations?
- How do APNs view their current online searching skills?
- What is the level of interest in receiving training in online searching and what type of training is preferred?

- Is the use of smartphones to answer clinical questions related to gender, level of education, population of practice area, practice type, or years approved to practice as an APN?

## ***METHODOLOGY***

### ***Materials***

This study used a 30-item questionnaire that was delivered to participants on the web using Qualtrics software (complete questionnaire available from the author). The introductory page detailed the purpose of the study and provided definitions for key terms as well as required IRB information. Participants had to indicate whether they wished to proceed with the survey and also if they were approved to practice as an APN in Alabama; the session ended for any participant who answered no to either question. Those who continued were asked about smartphone ownership, type, and use in clinical areas. Those who used smartphones in clinical areas were also questioned about barriers to smartphone use and apps used. Participants were next asked about the type of resource most often used to answer five types of clinical questions, time spent searching online for clinical questions, perception of search skills, use of common online resources, and barriers to information seeking in general. This section also inquired about previous training in, perceived need for, and preferred type of training in online searching. Finally, participants were asked to provide demographic information including gender, age, current Advanced Practice approval category, highest level of education, years approved to practice as an APN, population of practice area, and practice type.

### ***Procedure***

Two methods were used to recruit participants for this study. First, an announcement was posted to a listserv maintained by the Nurse Practitioner Alliance of Alabama.<sup>26</sup> Following a limited response (n=19), the decision was made to also send informational postcards to all APNs listed on Healthgrades,<sup>27</sup> an online resource for consumers looking for a hospital, physician, or APN. The list of APNs was obtained by entering “Nursing (nurse practitioner)” in the search box and “Alabama” in the location box. When this study was carried out, there were 1,947 Alabama APNs listed on the Healthgrades website. An additional 41 responses were received after the postcards were mailed, for a total of 60 responses. Both the announcement on the listserv and the postcards provided basic information about the study as well as a link to a formal information letter maintained online via Libguides software. The information letter provided a hyperlink to the questionnaire that was contained within Qualtrics secure online software. All data was collected anonymously. Fisher’s exact test with two-tailed p values was used to determine correlation. Two demographic variables (practice population and years approved to practice as an APN) were collapsed from five categories to two in order to use the Fisher’s Test. Two categories (primary place of practice and age group) could not be collapsed, so for those categories, correlation could not be determined.

### ***Participants***

Sixty responses were received. One respondent was not approved to practice as an APN in Alabama, leaving 59 usable responses. From the usable responses, only 50 APNs completed demographic information. Although the survey was open to all four APN categories (Certified Registered Nurse Practitioner, Clinical Nurse Specialist, Certified Registered Nurse Anesthetist, and Certified Nurse Midwife), 100% (n=50) of respondents who completed demographic

information were approved to practice as Certified Registered Nurse Practitioners. Eighty-six percent of participants (n=43) had an MSN (Master of Science in Nursing) or MN (Master in Nursing), with the remaining 14% (n=7) holding a DNP (Doctor of Nursing Practice).

Respondents varied in age, 16% (n=8) were 30 years old or younger, 28% (n=14) were 31 to 40 years old; 22% (n=11) were 41 to 50 years old, and 34% (n=17) were 51 or older. Thirty-five APNs (70%) had been approved to practice as an APN 10 years or less while the remaining 15 (30%) had been approved to practice for more than 10 years; 88% (n=44) were female and 12% (n=6) were male. For this study, rural was defined as areas with a population of 50,000 or less, non-rural as areas with more than 50,000 people; 62% (n=31) of respondents practiced in non-rural areas, 38% (n=19) in rural areas. Participants provided more specific information about rural populations and each rural population subgroup was represented. Of the 19 APNs who lived in rural areas, three were in areas with populations of less than 2,500 people, five lived in areas with 2,500 to 9,999 people, seven in areas with 10,000 to 29,999 people, and four in areas with 30,000 to 50,000 people. A large variety of practice types were mentioned: 44% (n=22) practiced in physician's offices, 20% (n=10) in outpatient clinics, 14% (n=7) in hospitals, 6% (n=3) in academic health centers, 4% (n=2) in employee health clinics, and 2% (n=1) each in hospice, nurse practitioner owned practice, VA nursing home, urgent care, health department, or dialysis unit.

## ***RESULTS***

All survey respondents (n=59) owned a smartphone, and 92% (n=54) reported using a smartphone at work. Several demographic variables were examined (see Table 1), but the only variable significantly related to smartphone use was years approved to practice as an APN.

Those approved to practice more than ten years were slightly less likely to use smartphones in clinical situations.

**TABLE 1. Correlation between Smartphone Use and Demographic Variables**

	Use smartphone at work	Do not use smartphone at work	<i>p</i> value
<b>Level of education</b>			
<b>MSN or MN</b>	39	2	.3837
<b>DNP</b>	6	1	
<b>Years approved to practice as APN</b>			
<b>10 years or less</b>	35	0	.0198*
<b>More than 10 years</b>	11	3	
<b>Gender</b>			
<b>Female</b>	41	3	1
<b>Male</b>	6	0	
<b>Practice population</b>			
<b>Rural (population 50,000 or less)</b>	19	0	.2788
<b>Non-Rural (population more than 50,000)</b>	28	3	

Note. \* $p < .05$  considered significant

### ***Type of Questions***

The use of smartphones to answer clinical questions varied with type of question (see Table 2). Smartphones were used most often to answer drug therapy questions. All respondents indicated that they answered drug therapy questions, and 79% (n=41) used their smartphones to do so. Other question types had lower usage. Only 31% (n=15) were using smartphones to answer questions related to non-drug therapy, with 29% (n=14) more likely to use a computer and 22% (n=11) to ask a colleague about non-drug therapy questions. Computers were used more often by respondents for the remaining three types of questions. Smartphones were used by only 25%

(n=13) for diagnosis/etiology questions, 16% (n=8) for patient education questions, and 14% (n=7) for prognosis questions.

**TABLE 2. Sources of Information Used for Clinical Questions by Type**

Question Type	Colleagues	Print resources	Online resources via smartphone	Online resources via desktop or laptop computer	Online resources via PDA or tablet	*Other resources	I don't encounter these types of questions	Total
<b>Drug therapy</b>	0	4	41	6	1	0	0	52
<b>Therapy (not drug related)</b>	11	5	15	14	1	2	1	49
<b>Diagnosis/etiology</b>	12	5	13	18	1	2	0	51
<b>Prognosis</b>	14	3	7	20	1	2	3	50
<b>Patient education</b>	1	14	8	25	1	1	1	51

Note: \*other resources mentioned include medical texts, former professors, and none

### ***Barriers***

Respondents were asked about barriers to information seeking via smartphones (see Table 3), with 43% (n=23) reporting that they had experienced no barriers with smartphone use while 39% (n=21) felt Internet connectivity was a problem. In contrast, when asked to list the most significant barrier to information access in general (see Table 4), almost half cited lack of time (45%, n=19); a far second was cost (14%, n=6).



**TABLE 3. Barriers Experienced when Using Smartphones to Answer Clinical Questions**

<b>Barrier</b>	<b># of responses</b>	<b>%</b>
No barriers experienced	23	43
Internet connectivity	21	39
Lack of knowledge of available resources	9	17
Use of phone in practice areas	5	9
Lack of search skills	5	9
Cost of phone or plan	3	6
*Other	3	6

Note: 54 participants answered this question, participants could choose multiple answers

\*Other-responses included phone charge issues, lack of time, and cost of apps

**TABLE 4. Most Significant Barrier to Information Access**

<b>Barrier</b>	<b>#</b>	<b>%</b>
Lack of time	18	43
Cost	6	14
Lack of education/skill	4	10
Internet access/connectivity	4	10
Too much information	4	10
Lack of resources	3	7
None	2	5
Sites difficult to search	1	2

Note: 42 participants answered this question

### ***Apps/Online Resources***

One advantage of smartphones is the availability of apps that can be downloaded for use on a phone. In some cases, an app can even be used without Internet connectivity. When asked to list phone apps essential for work, 49 respondents supplied lists containing from 1 to 19 apps for a total of 154 responses identifying 73 unique (listed by one person) apps (see Appendix A for complete list). Drug apps were mentioned more frequently than any other type. The only app mentioned by more than eight respondents was Epocrates, a mobile drug reference available in both free and for purchase formats. Epocrates was listed by 82% (n=40) of participants. APNs were also supplied with a list of commonly used online resources and asked to rank them with a Likert-type scale of “Very Useful,” “Useful,” “Neutral,” “Useless,” “Very Useless,” or “No Experience with this Resource.” Guidelines through professional organizations were considered

the most useful online resource followed closely by MedlinePlus (see Table 5). There were limited “Useless” or “Very Useless” responses; instead, there seemed to be an inverse relationship between “Useful” and “Very Useful” responses and “No Experience with this Resource” responses.

**TABLE 5. Usefulness of Selected Online Resources**

<b>Resource</b>	<b># of Useful or Very Useful Responses</b>	<b># of Neutral Responses</b>	<b># of Useless or Very Useless Responses</b>	<b># of “No Experience with Resource” Responses</b>
<b>Guidelines through professional organizations</b>	34	4	1	10
<b>MedlinePlus</b>	32	5	0	11
<b>Cochrane Library</b>	26	5	1	17
<b>Guidelines.gov</b>	24	7	1	17
<b>Pubmed Mobile or Handheld</b>	20	4	0	24
<b>Google Scholar</b>	20	4	3	22
<b>Pubmed Clinical Queries</b>	19	8	0	22
<b>National Center for Complementary and Alternative Medicine</b>	7	7	1	34
<b>Alabama Virtual Library</b>	3	8	0	38
<b>*Other</b>	6	0	0	1

Note: For this table useful/very useful and useless/very useless responses were combined.

\*Other responses included UpToDate, UAB/UAH, Family Practice Notebook, eMedicine, Medscape, CDC.gov, SUNA website, AUA website

### *Training Needs*

Only 41% (n=20) of respondents had received training in online or mobile searching for clinical questions, although 94% (n=47) reported that they regularly searched online for clinical information needs. Most APNs felt that their current searching skills were adequate (68%, n=34) or exceptional (22%, n=11). However, 68% (n=34) were interested in training in online searching, with an even larger percentage (82%, n=41) expressing interest if CE credit were offered. The most desired type of training was an “online tutorial which can be replayed” followed by “group learning led by an expert facilitator” (see Table 6).

**TABLE 6. Preferred Training Methods**

Training Method	# of respondents who ranked method highest (1 or 2)	# of respondents who ranked method lowest (4, 5, or 6)
Online tutorial which can be replayed	32	8
Group learning led by an expert facilitator	25	9
One on one instruction	22	19
A written instruction manual	16	25
An internet chat group or list serve	4	37
*Other	1	0

### *DISCUSSION*

Some findings of this study are analogous to those of earlier research on clinical information seeking. In 2009, Stroud, Smith, and Erkel identified drug apps as the most likely to be installed and used by APNs on PDAs.<sup>14</sup> Similarly, this study found that drug apps were the type most often listed as essential on smartphones, while a specific drug app (Epocrates) was the only app listed by a large percentage of respondents. Although smartphones were used equally or less

often than computers for most types of clinical questions, they were used much more for drug therapy questions. In 2003, Codgill found drug therapy information was the most frequent clinical information need of APNs.<sup>3</sup> The fact that smartphones were used by almost 80% of participants in this study to answer drug information questions seems to indicate that smartphones are essential tools for many APNs. Another finding similar to earlier studies<sup>1,28,29</sup> is that a majority of respondents (43%) reported lack of time as the most significant barrier in information seeking; however, it is noteworthy that an equal percentage reported no barriers when using a smartphone to answer clinical questions.

One difference between this study and an earlier study which focused on information seeking<sup>1</sup> is that, unlike computer access, smartphone use did not seem to be negatively affected by rural location. APNs practicing in locations with populations less than 50,000 people were just as likely to use smartphones at work and were no more likely to list Internet connectivity as a barrier. It is also interesting that although less than half of respondents had received training in online or mobile searching for clinical questions, a substantial number felt that their current searching skills were adequate or even exceptional. However, confidence in current searching skills did not seem to negatively affect desire for training since well over half of respondents were interested in training in online searching, preferably training via online videos.

#### ***LIMITATIONS AND FUTURE DIRECTION***

The major limitation of this study was the low response rate. Although it is not possible to determine how many people saw the announcement on the list serve, 1,947 informational postcards were mailed out with only 63 returned as undeliverable, leaving a minimum pool of 1,884 potential respondents. The 60 responses resulted in a response rate of only 3%. In addition, although the study announcement was open to both smartphone users and non-users, there is the

possibility that smartphone users were more interested and, therefore, more likely to complete the survey, resulting in selection bias.

Future areas of research include replicating the study utilizing methods to increase the survey response rate so that results would be more generalizable or to focus on APN category types who did not respond to this survey in order to discover if smartphone use is as widespread among clinical nurse specialists, nurse anesthetists, and nurse midwives as it seems to be among nurse practitioners.

### ***CONCLUSION***

This study attempted to determine how Advanced Practice Nurses were using smartphones to seek information at the point of care. A better understanding of how APNs look for information is useful for several purposes. Findings can be used to tailor both training sessions and resource collections intended to enhance the information literacy skills of APNs. They can also assist librarians in designing information literacy sessions for graduate nursing students who will soon be practicing APNs. Information regarding the types of questions answered using smartphones, training needs, and most helpful apps and online resources can be used by libraries to guide development of training and resources to assist both nursing students and practicing nurses to become more efficient and effective information seekers.

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## Appendix A

### Essential Apps Listed by Respondents

		Times listed
<b>Drug apps</b>		
1	Antibiotics	1
2	Bugs and drugs	1
3	CDC antibiotics app	2
4	Dialyze drugs	1
5	Drug app	1
6	D2rugs.com	1
7	EMRa abx	1
8	Epocrates	40
9	Immunization app	1
10	IV drip rate	1
11	Lexi comp pro	1
12	Micromedex	5
13	MPR	5
14	PDR	1
15	Ped doser	1
16	Prescribers letter	1
17	Safe dose	1
18	Sanford guide to antimicrobial therapy	2
19	Shots by STFM	1
	<b>subtotal</b>	<b>68</b>
<b>Lab apps</b>		
20	Labgear	1
21	Labvalues	1
22	LabCorp	1
23	Lab apps	1
	<b>subtotal</b>	<b>4</b>
<b>Calculator apps</b>		
24	Anemia calculator	1
25	BMI calculator	2
26	Calculator	1
27	Fitness app to calculate calories	1
28	FRAX	1
29	MD RN Tools	1

30	MediCalc	2
31	MELD Calculator	2
32	Ob Wheel	1
33	QX calculator	1
	<b>subtotal</b>	<b>13</b>
<b>ICD apps</b>		
34	ICD 9/10, Find a code	8
	<b>subtotal</b>	<b>8</b>
<b>General apps, multiple types of info</b>		
35	Clinical advisor	1
36	Medical wizards	1
37	Medscape	10
38	Merck	1
39	PSYC central	1
40	Skyscape	2
	<b>subtotal</b>	<b>16</b>
<b>Reference materials</b>		
41	Dermatology notes	1
42	Eponyms	1
43	Heart murmurs pro	1
44	iTriage	2
45	Muscle Trigger points	1
46	NCCN guidelines	1
47	Photoclinic	1
48	Sonoaccess*	1
49	Tabers Medical Dictionary	1
50	Toxicology	1
51	Visible body	1
	<b>subtotal</b>	<b>12</b>
<b>Point of care decision assistance (general)</b>		
52	5 minute clinical consult	2
53	5 minute emergency consult	2
54	Dxsaurus	1
55	FNP notebook	1
56	Pedi Stat	2

57	Peds toolkit	1
58	UpToDate	6
	<b>subtotal</b>	15
<b>Point of care (specific conditions)</b>		
59	Albuminuria	1
60	Asthma (tx app)	1
61	Cholesterol( tx app)	1
62	Depression (tx app)	1
63	STD Meister	1
	<b>subtotal</b>	5
<b>Google/language</b>		
64	Google	2
65	Google translate	1
66	Spanish	1
	<b>subtotal</b>	4
<b>Institutional/EHR access</b>		
67	Citrix rec. for portal access	1
68	Epic	2
69	MedConnect	1
	<b>subtotal</b>	4
<b>Other</b>		
70	Flashcards	1
71	MyCME	1
72	Pocket cloud	1
73	Ruler	1
	<b>subtotal</b>	4
	<b>Total apps listed</b>	154