

NIH Public Access

Author Manuscript

JAm Dent Assoc. Author manuscript; available in PMC 2014 January 01.

Published in final edited form as: *J Am Dent Assoc.* 2013 January ; 144(1): 49–58.

Electronic dental record use and clinical information management patterns among practitioner-investigators in The Dental Practice-Based Research Network

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Abstract

Objectives—Determine the: (1) extent of computer use for managing clinical information among practitioner-investigators in The Dental Practice-Based Research Network (DPBRN); (2) type of patient information kept electronically; and (3) willingness to reuse electronic dental record (EDR) data for research.

Methods-Web-based survey of 991 U.S. and Scandinavian practitioner-investigators.

Results—729 (74%) practitioner-investigators responded. Seventy-four percent of US solo and 78.7% of group practitioners used a computer to manage clinical information, and 14.3% and

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The DPBRN Collaborative Group comprises practitioner-investigators, faculty investigators, and staff investigators who contributed to this DPBRN activity. A list of these persons is at http://www.dpbrn.org/users/publications/Default.aspx

Authors' contributions Titus Schleyer contributed to the development of the survey questions used in the study, interpretation of all aspects of the study, analysis and writing of the article. Mei Song contributed to the interpretation of the results, analysis and writing of the article. Gregg Gilbert contributed to obtaining the funding; originating the study, the conduct, design, interpretation of all aspects of the study and writing of the article. Brad Rindal contributed to the development of the survey questions, interpretation of the results and writing of the article. Jeffrey Fellows and Valeria Gordan contributed to interpretation of the results and writing of the article. Ellen Funkhouser contributed to the statistical analysis of data, interpretation of the results and writing of the article.

15.9%, respectively, were paperless. U.S. practitioners stored appointments, treatment plans, completed treatment and images most often electronically, and the periodontal chart, diagnoses, medical history, progress notes and chief complaint least often. Over 90% of Scandinavian practitioners stored all information electronically. Fifty-one percent of all respondents were willing to re-use EDR data for research and 63% preferred electronic forms for data collection.

Conclusion—The results of this study demonstrate that the trend towards increased adoption of EDRs in the US is continuing, potentially making more data in electronic form available for research. Respondents appear to be willing to reuse EDR data for research and collect data electronically.

Clinical implications—The rising adoption of EDRs may offer increased opportunities for reusing electronic data for quality assurance and research.

Keywords

Dental Informatics; Attitude to Computers; Computers/statistics & numerical data/utilization; Data Collection; Dentistry; Medical Records Systems; Practice Management; Dental

Introduction

Hundreds of practitioners across the United States are currently participating in practicebased research networks (PBRN) funded by the National Institute of Dental and Craniofacial Research (NIDCR). The objective of the PBRN initiative, begun in 2005,¹ is to accelerate the development and conduct of clinical studies of important issues concerning oral health care. In April of 2012, the NIDCR extended this initiative through a 7-year, \$66.8m award for a national dental PBRN.²

To date, the overwhelming majority of dental PBRN studies have used paper forms for data collection. Study case report forms, used to record research data, essentially add a parallel data gathering process to the documentation of care during clinical operations. As many practitioner-investigators (p-is) in PBRNs have experienced, collecting research data can be labor-intensive. Sometimes, data that already have been collected in the process of clinical care are duplicated, creating extra work for the dental care team. Data are duplicated because research studies rarely reuse existing electronic dental data (Schleyer T, "Collecting research data from clinical practice: how can informatics help?," Presented at: I International Conference on Biodental Engineering; 2009 Jun 26–27; Porto, Portugal, 2009).

However, data from electronic patient records can be reused to great advantage, as several efforts in medicine have demonstrated,^{3–6} despite the obstacles to and limitations of doing so.⁷ Data reuse can help improve the identification and enrollment of eligible patients, data management, and data validation.⁸ Collecting research data through electronic patient records can eliminate logistical problems that occur with paper records by (1) making clinical data immediately available to researchers; (2) making useful information in the patient record accessible to clinical, epidemiologic and outcomes research; (3) reducing or eliminating secondary data entry, thus lowering research costs and improving efficiency;^{9,10} and, (4) making it possible to collect data longitudinally while conducting studies across PBRNs at the national level.¹¹

A key consideration in determining whether it is feasible to reuse dental patient record data for practice-based research is the type and proportion of clinical information that practitioners manage electronically. Reusing data from electronic dental records (EDR) on a broad scale will only be feasible when a critical mass of practitioners maintains most or all

of its patients' information electronically. We, therefore, briefly review the current status of and trends in the adoption of electronic dental records.

Several surveys within the last 10 years indicate a rapid increase in the use of chairside computing and EDRs by practitioners at large. In 2004/5, the Center for Dental Informatics surveyed a national random sample of general dentists in the US, which determined that 25% used a computer at chairside and 1.8% were completely paperless.¹² Two years later, in 2006/7, a survey of all dentists conducted by the American Dental Association¹³ yielded corresponding figures of 55.5% and 9.2%, respectively. Dentists who graduated from dental school within ten years had higher EDR adoption rates, with of 13.4% operating in a paperless environment. More than half the dentists (57.4%) were either very or somewhat likely to increase the percentage of work completed or records maintained electronically within the next 12 to 24 months. In a separate 2007 survey of US dentists, ¹⁴ 43.7% indicated that they were working with electronic patient records. The increasing adoption of electronic dental records in the US is mirrored in other countries.^{15–17}

The growing availability of electronic data offers increasing opportunities for reusing clinical data for research. Dentists in PBRNs, due to their demonstrated interest in dental research, may be particularly willing to contribute their clinical data to future studies. We therefore surveyed members of The Dental Practice-Based Research Network (DPBRN), a consortium of dental practices with a broad representation of practice types, practitioners, and treatment philosophies,¹⁸ regarding their use of EDRs and related technical issues.

The purpose of this study was to determine: (1) whether and to what degree DPBRN p-is used computers to manage clinical information; (2) what patient information they were keeping on paper and/or a computer; and (3) whether they were willing to use electronic means to participate in and communicate about DPBRN research studies. The results of this study are significant because they contribute to our understanding of how feasible it is to reuse EDR data for practice-based research.

Methods

The sample for this study consisted of all 991 p-is (dentists and dental hygienists) in the DPBRN. DPBRN practices are predominately located in Alabama, Mississippi, Florida, Georgia, Minnesota (dentists employed by the HealthPartners Dental Group [HPDG], http://www.healthpartners.com, as well as private practitioners), the Pacific Northwest (Permanente Dental Associates, http://permanentedental.kpnw.org) and in the Scandinavian countries of Denmark, Norway, and Sweden (collectively referred to as SK in this paper). This project was approved by the human participants institutional review boards (IRBs) at the University of Alabama at Birmingham and all of DPBRN's regional IRBs.

The design for this DPBRN study was cross-sectional, consisting of a single administration of the Infrastructure Update Survey (IUS), described further below, to all DPBRN p-is who had participated in one or more DPBRN studies of any type previously, and who were in current practice with an active practice address. While the scope of the IUS survey covered several aspects and characteristics of DPBRN practices relevant to conducting research, the focus of the current report is their use of EDR and electronic communications. The results of this questionnaire were combined with those of the 101-item Enrollment Questionnaire that all p-is completed when enrolling in the DPBRN. This questionnaire is publicly available¹⁹ and was used to obtain practitioner and practice characteristics, namely, gender, race, locale, type of practice, and year of graduation.

Thirty-four practitioners and DPBRN staff pre-tested a pilot version of the IUS. Subsequently, letters were sent by the main DPBRN administrative site to eligible

practitioners, inviting them to participate, and to provide them with a unique identification number and log-in code to complete the online survey. P-is were asked to complete the questionnaire within three weeks. Non-respondents received a reminder letter after the fourth week. After an additional four weeks, a final reminder was sent, along with a printed version of the questionnaire allowing the option of completing the online or paper version (ultimately, 87 practitioners completed the paper version instead of the online version). Individuals who had not responded after a final three-week waiting period were considered non-respondents. Practitioners or their business entities could request a \$50 remuneration as a gesture of appreciation for completing the questionnaire.

The questionnaire described in the paper was partially derived from an instrument used in a study of clinical computing conducted by the Center for Dental Informatics, University of Pittsburgh, in 2005.¹³ Questions included whether participants used a computer to manage clinical (as opposed to administrative) patient data (if not, how likely they were to do so within the next two years) and which brand of software they used. The questionnaire also asked whether respondents stored information in 13 clinical information categories (appointments, chief complaint, completed treatment, dental history, dental status, extraoral images, intraoral images, medical history, periodontal charting, diagnoses, progress notes, radiographs, and treatment plans) on paper, a computer or both. The questionnaire concluded by asking the respondents whether they were willing to reuse data from their EDR for research and use electronic, rather than paper forms, for collecting research data. The full IUS questionnaire is publicly available at the DPBRN Supplement page.²⁰

We report our results separately for solo private practice ("solo practice" from this point forward), group private practice ("group practice"), HealthPartners ("HPDG"), PDA, and other practice types by country, because both the country as well as the organizational environment influence EDR adoption significantly. Reporting aggregate results would have conflated several variables. Frequency distributions and bivariate cross-tabulations were calculated to examine associations between respondents' practice experience and use of computer; types of practice and the degree to which they store clinical information on the computer; and their use of computer and attitudes to using EDR data for research. The $\chi 2$ and Mantel-Haenszel $\chi 2$ trend tests were used to assess significance of the differences found. Statistical significance was assumed for a p-value less than 0.05. All analyses were performed using SAS (SAS/STAT version 9.2, SAS Institute, Inc.).

Results

Overall, 729 (74%) of 991 practitioners surveyed completed the questionnaire. Respondents did not differ from non-respondents, except with respect to the regions where respondents come from. Respondents from the Alabama/Mississippi region are underrepresented while respondents from the SK region are overrepresented in the final sample compared with the non-respondent group.

General practice characteristics

Table 1 presents general characteristics of the respondents. Participants practiced in four types of practice settings: (1) solo practice (50.3%); (2) group practice (29.8%); (3) HealthPartners Dental Group (HPDG) or Permanente Dental Associates (PDA) (11.4%); and other types (8.5%, including public health practice and academic settings). While age and year of graduation are possibly correlated, it shows that female, Asian and Scandinavian practitioners were relatively younger with more recent graduates, and solo practitioners tended to be older with a small number of recent graduates from 2000 or later.

Use of a computer to manage clinical information

The majority of respondents within each practice type used computers to manage clinical information (Table 2). In the U.S., all dentists at HPDG (100%) managed clinical information using computers, followed by PDA (93.3%), group practices (78.7%), and solo practices (73.8%). In the Scandinavian region, all practitioners in solo practice (100%, note small sample size, n=4) and almost all of those in group practice (91.7%) did so. The difference between solo and group practices in the U.S. was not statistically significant. However, the difference between group practices in SK and those in the US was significant (p < 0.05).

In the U.S., 30.5% of solo practitioners and 58.3% of group practitioners who reported not using a computer clinically indicated that they were very or somewhat likely to start doing so within the next two years, with the remainder being unlikely or unsure. All four group practitioners in SK who did not use a computer clinically said they were likely to do so within two years.

We divided respondents into four groups according to year of graduation (before 1980, 1980–1989, 1990–1999, and 2000 or later). Looking at the relationship between their practice experience and use of a computer, there is a significant association between the year of graduation and the use of computer to manage clinical information. The more recently solo practitioners graduated, the more likely they were to use a computer (p = 0.006). However, the same did not hold true for US group practices.

In the US, four major electronic dental record systems were used in 70.7% of all practices using computers. They included (percentage for solo/group practices in parentheses) Dentrix (40.3%/44%), Eaglesoft (25.4%/22.4%), SoftDent (10%/6.7%) and PracticeWorks (9.3%/11.9%), mirroring results from earlier studies.¹² Health Partners dentists used GSD Works in their practices, while PDA dentists used AxiUm. In the SK region, Al Dente (41.7%), Dental Suite (33.3%) and Opus (16.7%) predominated.

Storage of clinical information

A key focus of the survey was to assess what types of patient information DPBRN p-is stored on the computer, paper or both in each of 13 information categories. We first calculated a summary index of computer utilization by averaging the proportion of participants who stored patient information on the computer for each information category and practice type. On average, more respondents from SK group practices stored information on the computer than from any other groups (mean: 90%, SD: ± 0.03 , range: 85%–96%), followed by those from US group practices (mean: 62%, SD: ± 0.16 , range: 42%–92%), US solo practices (mean: 55%, SD: ± 0.15 , range: 37%–85%) and PDA practices (mean: 38%, SD: ± 0.38 , range: 0%–96%). The percentages of completely paperless practices were 54.2% (SK group practices), 15.9% (US group practices), 14.3% (US solo practices) and zero percent (PDA). Both SK solo practices and HPDG practices were 100% paperless. We omitted other practice settings due to the small, heterogeneous sample.

Figures 1 through 4 show the storage patterns for the 13 clinical information categories for US solo, US group, PDA and SK group practices. US solo practices (Figure 1) stored appointments on the computer most frequently (85%) and the chief complaint least frequently (37%). Treatment plans and completed treatment (both 73%) ranked after appointments, followed by three imaging modalities (intraoral, extraoral and radiographic images, each about 60%). The dental status is stored by 57% of all practices on the computer, while the medical history, progress notes and the chief complaint are only stored in 40% or fewer of the practices.

Group practices (Figure 2) exhibited a similar pattern with some variations. Importantly, group practices tended to store a larger percentage of information across all categories (average: 62%) on the computer than solo practices (average: 55%). As in solo practices, appointments and completed treatment ranked high, but group practices seem to have adopted digital radiography more broadly (75%) than solo practices (59%). The bottom six information categories, beginning with the dental status, are ranked the same in group as in solo practices, with the exception of the medical history (ranked 9th in group practices v. 11th in solo practices).

The pattern of computer and paper use at the PDA (Figure 3) reflected the fact that the organization had begun transitioning to a computer system for dental records at the time of the survey, but had not finished its implementation. The data show that the system was used primarily for appointments (96%), treatment plan (89%) and complete treatment (96%). Due to the implementation schedule, it is likely that practices and practitioners had adopted the new system to different degrees and for slightly different functions.

SK group practices stored an average of 90% of data in all information categories on the computer. As Figure 4 shows, all information categories except the imaging modalities and the chief complaint were stored on the computer by 90% or more of the practices.

We overlapped the white bars (paper) and black bars (computer) in Figures 1 to 4 for instances where the same information was duplicated on paper and the computer. A significant proportion of US solo and group practices duplicated the treatment plan and completed treatment in this way, but also did so for all other information categories, albeit less frequently. Duplicate storage of data for PDA reflected the ongoing transition from paper to the computer, while in SK group practices it was comparatively limited.

We also analyzed the association between the types of practice and the degree to which they store clinical information on the computer. For all 13 categories of information, the results are significant, indicating that the subgroups differ significantly by whether they record the clinical information on the computer or not (p < 0.05 for all categories).

Attitudes toward using electronic means for PBRN research

The survey included questions about whether participants would be willing to use electronic means to conduct some PBRN activities. Fifty-one percent of all respondents were willing to re-use EDR data for research and 63% preferred electronic forms for data collection. In the US, approximately 44% of dentists in solo and group practices (Table 3) were willing to reuse data from electronic dental records for DPBRN studies instead of recording them manually. Forty-two and 47%, respectively, were not sure, with the remainder being unwilling to do so. Dentists from HPDG/PDA were most interested in reusing EDR data for research (79.5%), while those from public health and community clinics were least interested in doing so (36.4%).

Overall, attitudes towards using electronic forms for collecting research data were more positive than for reusing data from the EDR. Approximately 57% of solo and group practitioners were willing to do so, as were the majority of HPDG/PDA and academic dentists. Conversely, with 54.5%, dentists in public health and community clinics were the least willing to do so. Attitudes among SK practitioners regarding reusing data from EDRs and using electronic forms for research work were substantially more positive than among their US counterparts. Among US solo practitioners, 50.4% (n=268) who used a computer to manage clinical information were more willing to reuse EDR data for PBRN studies (X2(2, N = 363) = 15.98, p < 0.05) than those who did not. Regarding using electronic forms for data collection, the corresponding number was 63.4% (X2(2, N = 363) = 17.73, p < 0.05). In

contrast, the attitudes of practitioners in group practices did not differ based on their computer use.

Discussion

The purpose of this study was to determine whether and to what degree DPBRN practitioners use computers to manage clinical information; what patient information they keep on the paper and/or the computer; and whether they are willing to use electronic means to participate in and communicate about DPBRN research studies. The fact that 73.8% of all solo practitioners and 78.7% of all group practitioners use computers to store clinical information showed a high penetration. PDA and HPDG practices used computers clinically at an even higher level, reflecting the organizational IT infrastructure and corporate priorities. In the SK region, computer adoption in solo practices was 100% and in group practices 91.7%. Compared to previous surveys,¹² clinical computer use in the US has increased significantly. If solo and group practitioners who reported they were very or somewhat likely to adopt clinical computing during the next two years follow through on these plans, adoption would rise to 88% and 95%, respectively. A comparison with the historical adoption curve for office computers among dentists¹² suggests that the rise for most dentists may not be as rapid, since it took from approximately 1995 to 2000 for adoption to increase from about 75 to 85%.

DPBRN practitioners are using computers to store a significant amount of clinical information across the 13 clinical information categories. Group practices in the US were slightly ahead of solo practices in the degree to which they did so. Fourteen percent of solo practices in the US were paperless, 15.9% of group practices, 54.2% of group practices in SK, and 100% of the HPDG and solo practices in the SK region. Findings from the PDA practices reflected the ongoing implementation of the electronic dental record. Information about appointments, planned and completed treatment, and digital images were most likely to be stored on the computer. Interestingly, the ranking of information categories with respect to the frequency of computer-based storage was essentially unchanged from our 2005 study.¹²

The response patterns on reusing data from EDRs and using electronic forms for research clearly reflect uncertainty among respondents. The fact that only about 44% of US solo and group practitioners were willing to reuse EDR data for research could be viewed with concern. However, an almost equal proportion of respondents replied with "don't know." Clearly, the overwhelming majority of private practitioners in the US have no experience in reusing their EDR data for research. One possible concern may have been the security of and access to their EDR data. Therefore, the uncertainty is understandable, and indicates the need for demonstrating benefits and drawbacks of the approach. It is likely that physicians participating in PBRNs had similar concerns early on. However, two electronic medical PBRNs in which several thousand physicians participate, the Distributed Ambulatory Research in Therapeutics Network³ and the Electronic Primary Care Research Network,⁴ have shown that such concerns can be overcome.

Except for a few studies, data from EDRs have not been reused broadly for research in dentistry. This circumstance leaves unanswered important questions regarding the storage format, appropriateness, usefulness, validity and reliability of EDR data.^{21–23} A major problem in reusing medical data for research has been, and is, the fact that a significant proportion of medical information is stored as free text, i.e. in an unstructured fashion. This problem may not be as significant in dentistry as in medicine, as ongoing work in our Center, supported by NIDCR grants DE019683 and DE021178, indicates. With the exception of progress notes, most EDRs store a significant proportion of data in structured

form. Other open questions regarding whether EDR data can be used effectively for research studies include (1) what data dentists store about their patients in detail; (2) how valid and reliable these data are; (3) how they could be merged and cross-tabulated across different vendor systems; and (3) what other problems and obstacles exist for reusing them for research.

The response rate of 74% in this survey is significantly above average, increasing confidence in the validity of the results. While a number of variables is likely to have influenced the response rate, the close identification of p-is with "their" network²⁴ may have been a key factor in our success. Since earlier studies have already shown that DPBRN members resemble the general population of practitioners,^{25,26} it is likely that our findings are generalizable.

In summary, results of this study demonstrate that the trend towards increased adoption of EDRs in the US is continuing and is expected to do so in the future. Practitioners are storing a significant amount of clinical information on computers, providing a potentially rich source of data for quality improvement and clinical, epidemiological, and comparative effectiveness research. Clearly, reusing data for secondary purposes must recognize the important role of confidentiality and security, and occur within the strict framework of the Health Insurance Portability and Accountability Act, as well as related regulations. However, EDRs may offer an important resource not just for supporting clinical care, but also for quality assurance and research to improve the nation's oral health.

Acknowledgments

This study was supported by grants U01-DE-16746, U01-DE-16747, R21-DE-19683, U19-DE-22516, and R21-DE-21178 from the National Institutes of Health. We are very grateful to Abu Faisal Hasme, BDS, MPH, and other staff at the DPBRN Coordinating Center for their assistance with statistical data analysis; and Michael Dziabiak from the Center for Dental Informatics at the University of Pittsburgh for his assistance with creating graphs and the final formatting of the manuscript. Opinions and assertions contained herein are those of the authors and are not to be construed as necessarily representing the views of the respective organizations or the National Institutes of Health.

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Figure 1.

Storage of major clinical information categories on paper/paper by US solo practices in the study.





Figure 2.

Storage of major clinical information categories on paper/paper by US group practices in the study.



PDA practices

Figure 3.

Storage of major clinical information categories on paper/paper by PDA practices in the study.



SK group practices

Figure 4.

Storage of major clinical information categories on paper/paper by SK group practices in the study.

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Table 1

Demographics and practice characteristics of study sample

						Year Gra	<u>duated</u>				
	Ľ.	[otals]	Before 1980 (n=219	; 30.0%)	1980–1989 (n=24)	3; 33.3%)	1990–1999 (n= 15	5; 21.3%)	2000 or later (n=11	2; 15.4%)	Р
	Z	%	Z	%	Z	%	Z	%	Z	%	
Gender (n=729)											
Male	545	74.8	201	36.9	182	33.4	101	18.5	61	11.2	000
Female	184	25.2	18	9.8	61	33.2	54	29.3	51	27.7	1000.>
Race (n=681)											
White	611	83.8	189	30.9	216	35.4	115	18.8	91	14.9	
Black/African-American	26	3.6	8	30.8	10	38.5	5	19.2	3	11.5	1000 0-
Asian	25	3.4	2	8.0	1	4.0	12	48.0	10	40.0	1000.0>
Other	67	9.2	20	29.9	16	23.9	23	34.3	8	11.9	
Locale (n=644, US only)											
Urban	546	84.8	164	30.0	187	34.2	126	23.1	69	12.6	
Rural	98	15.2	38	38.8	29	29.6	19	19.4	12	12.2	100.0
Type of practice (n=729)											
Solo private	367	50.3	119	32.4	146	39.8	78	21.3	24	6.5	
Group private	217	29.8	66	30.4	49	22.6	50	23.0	52	24.0	1000 0-
HealthPartners or PDA	83	11.4	15	18.1	26	31.3	19	22.9	23	27.7	1000.0>
Other	62	8.5	19	30.6	22	35.5	8	12.9	13	21.0	
Role (n=729)											
General dentists	666	91.4	195	29.3	222	33.3	140	21.0	109	16.4	
Specialists	57	7.8	22	38.6	18	31.6	14	24.6	33	5.3	0.269
Hygienists	9	0.8	2	33.3	ŝ	50.0	1	16.7	0	0.0	
Country											

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					Year Gra	nduated				
		Totals	Before 1980 (n=219; 30.0%)	1980–1989 (n=2	43; 33.3%)	1990–1999 (n= 15	(2; 21.3%)	2000 or later (n=11)	2; 15.4%)	Р
	Z	%	N %	Z	%	Z	%	Z	%	
United States	649	89.0	203 31.3	217	33.4	146	22.5	83	12.8	1000.02
Scandinavia	80	11.0	16 20.0	26	32.5	6	11.3	29	36.3	1000.0>
P - Chisq Test										

Table 2

Participants' use of computers to manage clinical information by type of practice and year graduated.

	U	.S.	Scand	inavia
	n/N	%	n/N	%
Type of practice				
Solo private	268/363	73.8	4/4	100.0
Group private	133/169	78.7	44/48	91.7*
HealthPartners	38/38	100	0/0	-
PDA	42/45	93.3	0/0	-
Other	16/34	47.1	25/28	89.3*
		P<0.001		ns
Year graduated				
before 1980	140/203	69.0	15/16	93.8
1980–1989	168/217	77.4	24/26	92.3
1990–1999	117/146	80.1	9/9	100.0
2000 or later	72/83	86.8	25/29	86.2
		P=0.006		ns
Among solo practices year graduated				
before 1980	75/117	64.1	2/2	100.0
1980–1989	107/144	74.3	2/2	100.0
1990–1999	64/78	82.1	0/0	-
2000 or later	22/24	91.7	0/0	-
		P=0.006		-
Among group practices year graduated				
before 1980	43/58	74.1	7/8	87.5
1980–1989	29/33	87.9	15/16	93.8
1990–1999	36/45	80.0	5/5	100.0
2000 or later	25/33	75.8	17/19	89.5
		ns		ns

P - Chisq Test for within group comparisons; ns: not significant (P>0.05)

 * P<0.05 for differences between U.S. and Scandinavia

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Darticinants attitudes toward using electronic means for DBRN research in US. Due to rounding not all values equal to 100%

Schleyer et al.

IssuesSolo n=363 (%)Group n=169 (%)HPDG/PDA n=83 (%)Academic n=16 (Willingness to use EDR data for PBRN studies $162 (44.6\%)$ $74 (43.8\%)$ $66 (79.5\%)$ $7 (43.8\%)$ Yes $50 (13.8\%)$ $162 (44.6\%)$ $74 (43.8\%)$ $66 (79.5\%)$ $7 (43.8\%)$ No $50 (13.8\%)$ $16 (9.5\%)$ $1 (1.2\%)$ $3 (18.8\%)$ Don't know $151 (41.6\%)$ $79 (46.8\%)$ $1 (11.2\%)$ $3 (18.8\%)$ Willingness to use electronic forms to collect research data $207 (57.0\%)$ $98 (58.0\%)$ $67 (80.7\%)$ $10 (62.2\%)$ NoYes $207 (57.0\%)$ $98 (58.0\%)$ $67 (80.7\%)$ $10 (62.2\%)$ Don't hous $110 (50.2\%)$ $98 (58.0\%)$ $2 (2.4\%)$ $3 (18.2\%)$ Don't hous $10 (52.2\%)$ $10 (52.2\%)$ $2 (2.4\%)$ $3 (18.2\%)$						
Willingness to use EDR data for PBRN studies 162 (44.6%) 74 (43.8%) 66 (79.5%) 7 (43.4%) Yes 162 (44.6%) 74 (43.8%) 66 (79.5%) 7 (43.4%) No 50 (13.8%) 16 (9.5%) 1 (1.2%) 3 (18.4%) Don't know 151 (41.6%) 79 (46.8%) 16 (19.3%) 6 (37.4%) Willingness to use electronic forms to collect research data 207 (57.0%) 98 (58.0%) 67 (80.7%) 10 (62.4%) No 46 (12.7%) 11 (6.5%) 2 (2.4%) 3 (18.4%)	Issues	Solo n=363 (%)	Group n=169 (%)	HPDG/PDA n=83 (%)	Academic n=16 (%)	Public Health n=11 (%)
Yes $162 (44.6\%)$ $74 (43.8\%)$ $66 (79.5\%)$ $7 (43.8\%)$ No $50 (13.8\%)$ $16 (9.5\%)$ $1 (1.2\%)$ $3 (18.5\%)$ Don't know $151 (41.6\%)$ $79 (46.8\%)$ $16 (19.3\%)$ $6 (37.5\%)$ Willingness to use electronic forms to collect research data $207 (57.0\%)$ $98 (58.0\%)$ $67 (80.7\%)$ $10 (62.5\%)$ Yes $207 (57.0\%)$ $98 (58.0\%)$ $67 (80.7\%)$ $10 (62.5\%)$ $10 (62.5\%)$ No $46 (12.7\%)$ $11 (6.5\%)$ $2 (2.4\%)$ $3 (18.5\%)$ Don't know $110 (30.3\%)$ $60 (35.5\%)$ $14 (16.9\%)$ $3 (18.5\%)$	Willingness to use EDR data for PBRN studies					
No $50 (13.8\%)$ $16 (9.5\%)$ $1 (1.2\%)$ $3 (18.8)$ Don't know $151 (41.6\%)$ $79 (46.8\%)$ $16 (19.3\%)$ $6 (37.2)$ Willingness to use electronic forms to collect research data $207 (57.0\%)$ $98 (58.0\%)$ $67 (80.7\%)$ $10 (62.2)$ Yes $207 (57.0\%)$ $98 (58.0\%)$ $67 (80.7\%)$ $10 (62.2)$ No $46 (12.7\%)$ $11 (6.5\%)$ $2 (2.4\%)$ $3 (18.1)$ Don't house $110 (30.3\%)$ $60 (35.5\%)$ $14 (16.9\%)$ $3 (18.1)$	Yes	162 (44.6%)	74 (43.8%)	66 (79.5%)	7 (43.8%)	4 (36.4%)
Don't know 151 (41.6%) 79 (46.8%) 16 (19.3%) 6 (37.5 Willingness to use electronic forms to collect research data 207 (57.0%) 98 (58.0%) 67 (80.7%) 10 (62.5 Yes 207 (57.0%) 98 (58.0%) 67 (80.7%) 10 (62.5 No 46 (12.7%) 11 (6.5%) 2 (2.4%) 3 (18.5 Don't know 110 (30.3%) 60 (35.5%) 14 (16.9%) 3 (18.5%)	No	50 (13.8%)	16 (9.5%)	1 (1.2%)	3 (18.8%)	1 (9.1%)
Willingness to use electronic forms to collect research data 207 (57.0%) 98 (58.0%) 67 (80.7%) 10 (62.1%) Yes 207 (57.0%) 98 (58.0%) 67 (80.7%) 10 (62.1%) No 46 (12.7%) 11 (6.5%) 2 (2.4%) 3 (18.1%) Double house 110 (50.3%) 60 (35.5%) 14 (16.9%) 3 (18.1%)	Don't know	151 (41.6%)	79 (46.8%)	16 (19.3%)	6 (37.5%)	6 (54.6%)
Yes 207 (57.0%) 98 (58.0%) 67 (80.7%) 10 (62.5 No 46 (12.7%) 11 (6.5%) 2 (2.4%) 3 (18.5 Don't brow 110 (30.3%) 60 (35.5%) 14 (16.9%) 3 (18.5%)	Willingness to use electronic forms to collect research data					
No 46 (12.7%) 11 (6.5%) 2 (2.4%) 3 (18.7 Don't know 110 (20 3%) 60 (35 5%) 14 (16 9%) 3 (18.	Yes	207 (57.0%)	98 (58.0%)	67 (80.7%)	10 (62.5%)	6 (54.5%)
Dom't know 110 (30 3%) 60 (35 5%) 14 (16 9%) 3 (18	No	46 (12.7%)	11 (6.5%)	2 (2.4%)	3 (18.8%)	0(0.0%)
	Don't know	110 (30.3%)	60 (35.5%)	14 (16.9%)	3 (18.8%)	5 (45.5%)