Electronic Health Records and Patient Safety:
Nurse Practitioners' Experiences in Clinical Practice

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Background: EHR and Patient Safety

- Many different EHR products on the US market
- Lack of consistency among EHR products
- EHR adoption has been linked to adverse patient outcomes
- Previous research has linked improper EHR configuration and use with adverse patient events (IOM, 2011; Meeks et al., 2014)
- Few if any studies have evaluated healthcare providers' experiences with electronic health records and the impact EHRs have on patient safety

Purpose

- The purpose of this study was to evaluate nurse practitioners' experience and satisfaction with EHRs and to describe EHR related problems encountered in clinical practice and the impact on patient safety

Methods

- Descriptive study
- Surveyed 431 nurse practitioners' about experiences with EHRs
- Data collected at the American Association of Nurse Practitioners annual meeting in New Orleans, June 2015
- Approved by IRB

Methods: Survey

- 23- item survey
- Demographic survey:
  - Age
  - Gender
  - Years of practice
  - Education
  - Practice setting
  - Specialty
  - Years of experience using EHR
  - Hours spent using EHR/8 hour shift
  - EHR brand

- 9-items rated on 5 point Likert scale
  - Preferences
  - Comfort
  - Satisfaction with EHR
  - Time management
  - Patient outcomes
  - Experience with EHRs
  - Accessibility of Information
  - Job Satisfaction
  - Patient Care
- Open ended question:
  - "Describe any problems you have experienced in the past with EHRs"

Data analysis

- Responses to the survey questions were analyzed using SPSS statistical software
- Content analysis of responses to the open ended question was conducted by 3 researchers to identify common themes among the responses

Results: Sample

- 431 Nurse practitioners
- Gender:
  - Female= 382 (88.6%)
  - Male=49 (11.3%)
- Reported using 94 different EHRs

- Education:
  - Doctoral degree= 97 (22.5%)
  - Master's degree=328 (76.1%)
  - Bachelor's degree=6 (1.4%)

Results: Practice Setting

- Practice setting:
  - Outpatient=354(82.1%)
  - Inpatient=77(17.9%)
  - Family practice=53%
  - Other Specialties=47%
    - (Home health, Internal medicine, OB GYN, Cardiology, Endocrine, Pediatrics, ICU/CCU, ER/Urgent care, PACU, Orthopedics, Oncology, Genetics, Neuro, Palliative Care, Dermatology, Geriatrics, Occupational, Pain management)

- Type of patient documentation used:
  - Electronic Health Records=381 (88.4%)
  - Paper Records=21 (4.9%)
  - Combination of both paper and electronic=29 (6.7%)

Results: Nurse Practitioner Sample

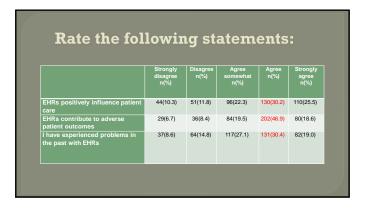| N=431	Range	Mean	Std. Deviation
Age (years)	23-78	48.3	10.6
Experience using EHR (years)	1-28	7.8	4.8
Hours using EHR/ 8 hour shift	0-7	6.13	3.8
Practice experience (years)	0-41	10.5	8.1
Number of providers outpatient practice	0-1500	19.01	104.2
Number of beds inpatient practice	0-1200	348.5	317.4

Rate the following statements:

	Strongly disagree n(%)	Disagree n(%)	Agree somewhat n(%)	Agree n(%)	Strongly agree n(%)
I prefer using EHRs over paper records	30(7)	22(5.1)	57(13.2)	116(26.9)	206(47.8)
I am comfortable using EHRs	15(3.5)	5(1.2)	31(7.2)	150(34.8)	230(53.4)
Information can be found easily on my current EHR	30(7)	49(11.4)	112(26)	122(28.3)	119(27.9)

Rate the following statements:

	Strongly disagree n(%)	Disagree n(%)	Agree somewhat n(%)	Agree n(%)	Strongly agree n(%)
I am satisfied with my current EHR	53(12.3)	63(14.6)	128(29.7)	94(21.8)	93(21.6)
EHRs positively influence productivity and time management	64(14.9)	64(14.9)	115(26.7)	95(22.0)	93(21.6)
EHRs positively influence job satisfaction	55(12.8)	70(16.2)	127(29.5)	96(22.4)	83(19.3)

Rate the following statements:

	Strongly disagree n(%)	Disagree n(%)	Agree somewhat n(%)	Agree n(%)	Strongly agree n(%)
EHRs positively influence patient care	44(10.3)	51(11.8)	96(22.3)	130(30.2)	110(25.5)
EHRs contribute to adverse patient outcomes	29(6.7)	36(8.4)	84(19.5)	202(46.9)	80(18.6)
I have experienced problems in the past with EHRs	37(8.6)	64(14.8)	117(27.1)	131(30.4)	82(19.0)

Summary of Main Points...

- **Preference:** Some preference for paper
- **Comfort:** About half of the respondents were comfortable using EHRs
- **Ease:** Only 27% strongly agreed that information was easy to find on their current EHR
- **Satisfaction:** Only 21.6% strongly agreed that they were satisfied with their current EHR
- **Productivity:** Only 21.6% strongly agreed that EHRs positively influence productivity
- **Job satisfaction:** Only 19.3% strongly agreed the EHRs positively influence job satisfaction
- **Patient care:** About 23% disagreed that EHRs positively influence patient care
- **Adverse patient outcomes:** Over half of the participants agreed that EHRs contribute to adverse patient outcomes
- **Problems in the past:** Over half of the participants reported problems in the past with EHRs

Main Themes

- "Describe any problems you have experienced in the past with EHRs"
  - 8 Themes
    - Glitches/crashes
    - Difficulty finding information
    - Too much time/Too many clicks
    - Decreases relationship with patient
    - Medication problems
    - Program difficulties
    - Charting on Auto-pilot
    - Positive thoughts

Glitches/crashes

- "My EHR crashed and the "cloud" crashed as well. The EHR company lost all patient information in our EHR database. I now have to keep paper and EHR records to avoid loss of info in the future."

Difficulty Finding Information

- "Difficulty finding information; incomplete/difficult to find problem list; difficult transition from paper to EHR; Difficulty finding correct wording for many diagnoses and lab tests."

- "Difficult to find info--difficult to input info, difficult to locate orders based on input (ie cardiac surgery prep, can't find with term cardiac)"

Too much time/Too many clicks

"I have to do 18 clicks on my E.H.R to order only 1 lab. It takes too much time to switch pages. It is not user friendly--was not developed by any practitioner--not medically oriented for our practice. Training was too expensive so we got the bare minimum and have to explore on our own to learn anything. I warned my Doc about the bad reviews but she bought it because of the good local tech support. Turns out it is so difficult to use, that's why there is good tech support. I sometimes spend 1 hour finishing 1 patient visit."

Takes Away Time From Patient/Decreases Relationship With Patient

"Documentation takes away from time with patient; I spend more time typing than I do talking to /examining patient. Pt's feel they're interrupting if they speak while I type."

Medication Problems

"Medication instructions not correct in dosages for Rx."

"Medical history, documentation, and medication errors."

"During medications reconciliation, an order was placed at a toxic range. Was not picked up by system. I was able to catch it before it went through."

Program Difficulties

"Duplicate information in various areas of the chart. Notes are not always straight forward. Easy to make mistakes."

Charting on auto-pilot

○ "Noting other providers' "copy and paste" notes, don't update their assessments, recommendations or plans, day to day."

○ "Tending to cut and paste contributes to errors."

Positive Thoughts

○ "I haven't had any adverse outcomes."
○ "I believe E.H.R make keeping records easier for patient records. Way better than paper charting."
○ "Just getting acquainted with it. It's a great system. It saves time."

Adverse Patient Events

○ "Important data lost resulting in lab and imaging results not being seen and high INR not seen and patient had a cranial bleed. Breast mass needing a biopsy not seen and patient not referred in timely manner. Lab results added to wrong providers queue, not dealt with timely. Wrong medications sent via e-scribe or with wrong doses/instructions because EHR sent default Rx. I could write a book!"

○ "Pt sent to hospital, med list on EMR not correct so wrong meds given at hospital. Electronic Rx not being sent promptly-held in even queue x 2 days over weekend--pt did not get antibiotic for 2 days."

Conclusions

○ Majority of nurse practitioners in this study experienced problems in the past with EHRs
○ Further research:
  • Usability and safety of EHRs from practitioner perspective
  • How well specific EHR safety features are implemented in clinical practice to improve patient safety
  • Effectiveness of EHR training for nurse practitioners in the ambulatory setting