Improving Nursing Workflow Efficiency & Nurses' Knowledge & Attitude Toward Computers

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WellStar Health System

- Not-For-Profit 5-Hospital System ~ 1294 Beds
- Integrated Health System: 2 Health Parks, 1 Nursing Home, 2 Hospices, 8 Urgent Care Centers, 16 Imaging Centers, 1 Pediatric Center

- 180 Physician Offices (850+ Medical Group Providers)
- 69,900+ Discharges/year
- 9,500+ Deliveries/year
- 14,000+ Team Members
- Revenues > $1.9 Billion

Background

- In a hybrid medical record system, the prior electronic medical record (EMR) at the organization did not interface with other applications resulting in disconnected documentation and fragmentation of patient care delivery; this disjointed workflow challenged the cohesion of the healthcare team to provide optimal patient care
- Nurses were experiencing major barriers including, but not limited to:
  - 16 character limitations
  - No hard stops, reminders or hover features
  - No design modifications
  - Limited ability to free text
  - Duplicate entry of information in multiple places/times
  - Minimal electronic reports
  - No logic associated with the system
- Nurse productivity and morale were low which ultimately affects nurses' ability to provide safe, quality patient care

Project Aim

To evaluate the effects of an integrated computerized electronic medical record (EMR) system in comparison to a partially computerized EMR system on workflow efficiency in nurses' documentation and perceptions of nurses' knowledge and attitudes

Project Timeline

- Survey (N = 235) and observation data (N =165 consented nurses & 255 observations) were collected January 2012 to March 2012
- Survey (N = 235) and observation data (N = 239 consented nurses & 529 observations) were collected December 2014 to February 2015

Methods

- **Setting/Sample**
  - 5-hospital healthcare system located in the Southeast United States
  - A convenience sample of registered nurses
- **Human Subject Protection**
  - WellStar Research Council and Kennesaw State University IRB approvals
  - Informed Consent - Observations
  - Cover Letter Consent - Online Survey (Qualtrics)

Data Collection

Instrument	Description
Demographic Survey	15-items: age, race, years practice, nursing degree, etc.
Observation Tool	Developed by researchers to capture type of nursing documentation activity (nurse documenting an admission, shift assessment, care plan, teaching/education, discharge, etc. in EMR); time it took nurse to complete documentation; work shift; location of activity (patient room, nurses station)
Staggers Nursing Computer Experience Questionnaire (SNCEQ)$_1$	24 items: measure previous computer experience; 4-point Likert scale 1= *none* to 4 = *extensive*; scale psychometrically sound
Nurses' Attitude towards Computerization$_2$	20 items: measure nurses perceived attitude toward computerization; 1 = *disagree strongly* to 5 = strongly *agree*; scale psychometrically sound

Data Analysis

Quantitative Analysis

- SPSS 22.0
- Pre-analysis data screening conducted prior to statistical analysis
- Statistical methods included frequencies, percentages, means, standard deviations, dependent t-test
- A *p* value of ≤ .05 considered statistically significant

Data Collection - Observations

- Time study observations were conducted on morning, evening and night shifts by trained observers
- Intraclass reliability estimates indicated a high degree of consistency across raters
- Data collection logs were collected at baseline and post to ensure logs were accurate
- Observations started when the nurse started a documentation activity; if interruptions occurred, the timer stopped and restarted once the nurse returned to activity
- Each nursing documentation activity (observation category) and documentation location (EMR) were defined to ensure observers were consistent with observations

Overall Findings

- Significant improvements were found in nurse efficiency post EMR for admissions, care plans, teaching/education, and discharges
- Significant improvements were found in nurse knowledge and attitude toward computers

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Findings- Observation Demographics

	Pre-Baseline (%) N = 255	Post (%) N = 529
Observation Time		
7a - 3p	112 (43.9)	186 (35.2)
3p - 11p	96 (37.6)	153 (28.9)
11p - 7a	44 (17.3)	184 (34.8)
Missing	3 (1.2)	6 (1.1)
Type of Documentation		
Computer	181 (70.9)	516 (97.5)
Handwritten	68 (26.7)	9 (1.7)
Both	6 (2.4)	4 (0.8)
Unit Type		
Medical Surgical	132 (51.8)	344 (65.0)
Stepdown	57 (22.4)	34 (6.4)
Critical Care	65 (25.5)	141 (26.7)
Women's Services	0 (0)	10 (1.9)
Missing	1 (0.3)	0 (0)
Location of Documentation		
Patient Room	73 (28.6)	140 (26.4)
Nurses' Station	119 (46.6)	288 (54.4)
Hallway	51 (20)	81 (15.3)
Medication Room	1 (0.4)	0 (0)
Other	6 (2.4)	4 (0.8)
More than one location	5 (2.0)	13 (2.5)
Missing	0 (0)	3 (0.6)
	N = 34	N = 68
Previous Admission		
Yes	12 (35.5)	9 (19.2)
No	22 (64.5)	39 (53.4)
Transfer/Other	0 (0)	20 (27.4)
	N = 34	N = 67
Emergency Department Admission		
Yes	8 (23.5)	49 (67.1)
No	26 (76.5)	18 (32.9)

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Observation Findings

Documentation Activity Type (in minutes)	Pre-Baseline	Post	t	p
Admission *(n)*	34	73		
Mean *(SD)*	21.09 (9.1)	13.88 (6.0)	4.21	.00
Median, range	20.5 (5-38)	12 (5-33)		
Physical Assessment *(n)*	60	108		
Mean *(SD)*	6.23 (3.2)	5.40 (2.9)	1.71	0.09
Median, range	6 (1-4)	5 (1-14)		
Plan of Care *(n)*	40	106		
Mean *(SD)*	1.53 (.82)	1.10 (1.1)	2.29	0.02
Median, range	1 (0-4)	1 (0-5)		
Teaching/Education *(n)*	32	72		
Mean *(SD)*	7.09 (11)	1.46 (1.7)	2.88	.01
Median, range	4 (0-62)	1 (0-10)		
Discharge *(n)*	27	34		
Mean *(SD)*	24.63 (18)	11.74 (6)	3.66	.00
Median, range	21 (6-74)	12 (4-25)		
Notes *(n)*	17	55		
Mean *(SD)*	1.06 (1.1)	1.78 (2)	1.43	0.16
Median, range	1 (0-2)	1 (0-13)		
Vital Signs/Intake/Output *(n)*	45	81		
Mean *(SD)*	.62 (.7)	.72 (1.1)	0.53	0.6
Median, range	1 (0-2)	1 (0-4)		

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Take Away - Observation Findings

Our desired outcome: improve nurse efficiency secondary to implementing integrated EMR

- Gains in documentation efficiency were found in workflows that were interdisciplinary but disconnected prior to new EMR
- Gains also created through ease of accessing data and documentation across care locations
- Gains found with workflow integration for documenting POC and education

Findings - Survey Demographics

Survey Only Sample Characteristics. N = 235

	Range	M	SD
Age (years)	21 - 69	41.01	11.71
Years Experienced	<1 - 42	13.44	11.06
Years Worked with Computers	1 - 35	15.10	6.83
		N	*(%)*
Gender			
Female		208	(88.5)
Male		27	(11.5)
Job Role			
Clinical Registered Nurse		167	(71.1)
Nurse Leader		14	(6.0)
Nurse Educator		7	(2.9)
Clinical Nurse Leader, Specialist, Practice Specialist		8	(3.4)
Other (Wound Care, IV Therapy)		92	(16.6)
Degrees			
Diploma RN		12	(5.1)
Associate Degree		40	(17.0)
Baccalaureate Degree		135	(57.4)
Master's Degree, post-masters		19	(8.1)
Other		6	(2.6)
Missing		23	(9.8)
Unit Type			
Medical-surgical		62	(26.4)
Step-down		10	(4.3)
Critical care		66	(28.1)
Women's services		18	(7.6)
Other		56	(23.8)
Missing		23	(9.8)

Survey Findings

	Pre-Survey *Mean (SD)*	Post-Survey *Mean (SD)*	*t*	*p*
Staggers Nursing Computer Experience Questionnaire (N= 212)	3.22 (.44)	3.28 (.48)	-1.23	.22
Knowledge	3.22 (.48)	3.32 (.50)	-2.07	**.04**
Computer Use	3.23 (.44)	3.24 (.54)	-.270	.79
Nurses' Attitude toward Computerization (N=212)	49.35 (6.52)	50.95 (6.72)	-2.49	**.02**
Patient Care	17.18 (2.13)	20.66 (2.52)	-54.40	**.000**
Benefit to Institution	14.88 (2.62)	15.45 (2.60)	-2.12	**.03**
Legal Aspects	11.17 (1.82)	11.42 (1.98)	1.23	.22
Capabilities of Computers	15.37 (2.41)	16.01 (2.59)	-2.69	**.01**

Take Away - Survey Findings

Improved *Knowledge* and *Attitude* likely related to:

- Nurses were accustomed to documenting in an EMR so adjusted to new tool
- Validation process to customize new EMR provided an opportunity to "vet" workflows and clean up documentation
- Benefits to patient care and institution experienced due to improved workflows

Future Directions

- **Focus on Variation:** continue to work to standardize practice around the system and optimize new EMR
- **Error Proofing:** working to use clinical decision support tools appropriately, such as Best Practice Alerts (BPAs) while avoiding "alert fatigue", effective use of intended safety nets such as 'hard-stops' without compromising workflows, etc.
- **Training Needs:** new EMR has options to customize at user level that can increase efficiency but is not fully understood by team members

References & Other

References

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