Slide 1

Creating Usable Systems for Nurses: Recommendations from
The TIGER Usability Collaborative

Greg Alexander, PhD, RN
Cheryl D. Parker, MSN, PhD, RN
Nancy Staggers, PhD, RN, FAAN
Denise Tyler, MSN, MBA, RN-BC

T.I.G.E.R.

Slide 2

Technology Informatics Guiding Education Reform   T.I.G.E.R

TIGER Vision

- Allow informatics tools, principles, theories and practices to be used by nurses to make healthcare
  - Safer, effective, efficient, patient-centered, timely and equitable
- Interweave enabling technologies transparently into nursing practice and education
  - *Making information technology the stethoscope for the 21st century*
- Better prepare our nursing workforce (all practicing nurses and nursing students)
  - To use technology and informatics to improve the delivery of patient care.

Slide 3

TIGER - 9 Collaborative Teams   T.I.G.E.R.

1. Standards and Interoperability
2. Healthcare IT National Agenda/HIT Policy
3. Informatics Competencies
4. Education and Faculty Development
5. Staff Development/Continuing Education
6. Usability and Clinical Application Design
7. Virtual Demonstration Center
8. Leadership Development
9. Consumer Empowerment/Personal Health Record

Slide 4

Usability & Clinical Application Design Collaborative   T.I.G.E.R.

Co-Chairs

Nancy Staggers, PhD, RN, FAAN
Professor and Director
Informatics Program, College of Nursing
University of Utah

Michelle R. Troseth, RN, MSN
Executive Vice President and Chief Professional Practice Officer,
Clinical Practice Model Resource Center (CPMRC)/Elsevier

Workgroup Leaders

Gregory L. Alexander, PhD, RN
Sinclair School of Nursing
University of Missouri
Cheryl Parker, MSN, PhD, RN
Senior Clinical Informatics Specialist
Motion Computing
Patti Rogers, MBA, RN, BC
Director, Patient Care Services
Texas Children's Hospital

Kathleen Smith, MScEd, RN, FHMIMS
Informatics Consulting and Continuing Education, LLC
Denise Tyler, RN-BC, MSN/MBA
Clinical Specialist, Information Systems
Kaweah Delta Health Care District

Slide 5

Workgroup Members   T.I.G.E.R.

- Nicole Barker
- Ryan Bramhall
- Page Cedarholm
- Pamela Charney
- Carol Chau
- Marta DePaul
- Shari Falan
- Christine Gamlen
- Maria Henrickson
- Constance Johnson
- Brenda Kulhanek
- Angela Lewis

- Lory Maddox
- Sandra McPherson
- Gretchen Moyer
- Tim O'Conner
- Carol Peterson
- Luziminda Ronquillo
- Stephanie Rogers
- Troy Seagondollar
- Lee Stabler
- Marisa Wilson
- Debra Wolf
- Shirley Woodhead

Slide 6

Usability: The Highest Ranked Collaborative   T.I.G.E.R.

- The Usability and Clinical Application Design Collaborative
  - Ranked the highest priority
  - Had the greatest number of volunteers (53.5%)
- Speaks to the significance of the topic for practicing nurses
- Nurses must be educated about usability and key clinical application design principles
  - Will determine how well evidence and informatics is integrated into day-to-day practices
- Nurses need innovative technology to simplify their work and provide clinical guidance for the safety of their patients

The Problem

- Current information systems and technology in practice
  - Do not always meet the workflow and information flow requirements of nurses and other clinicians
- Information technology should provide
  - Evidence-based, patient-centric technology
  - Interdisciplinary collaboration at the point-of-care
- To redefine reality, nurses must know
  - The significance of usability and clinical application design

Usability Collaborative Outcomes

- Synthesized a comprehensive literature review
  - From nursing and other disciplines
- Collected case studies and examples
  - Illustrate usability/clinical application design
  - Good examples and things to avoid
- Developed recommendations for HIT vendors and practitioners
  - Sound principles of usability and clinical design for healthcare technology

Why Focus on Usability?

Medical professionals have been trained to expect that some things just do not work, and they should devise ways to work around them, rather than notifying managers to change the system

Weare & Perry, 2002

What is Usability?

Usability is the extent to which a product can be used by specified users to achieve specified goals with effectiveness, efficiency, and satisfaction in a specified context of use

(ISO 9241)

Evidence-based, interoperable intelligent systems that support education and practice to foster quality care and safety

(TIGER 2008)

Usability is Concerned With:

- Efficiency
  - Productivity
    - How time-efficient is the application?
  - Error Frequency
    - How well does the product help end users avoid errors that impact their efficiency?
  - Learnability
    - How quickly can a person learn to use the application?
- Effectiveness
  - Fit with workflow
    - How well the system matches the way users think and work
  - Accuracy
    - How well the system supports patient safety, preventing critical errors
  - Memorability
    - How well users remember the use of a system if they were away from it
- Satisfaction
  - How well end users like using the system

Background Literature

- CINAHL, Ovid MEDLINE, PsycINFO, INSPEC, EBM Reviews, Health Technology Assessment Database (CLHTA)
- Search Terms:
  - HCI : HF or Usability : health$ or healthcare : nurs$
- Nearly 12,000 peer reviewed manuscripts - 215 articles retained
- Range of manuscript publication 1975-2009
- Usability experts sorted key words from literature using Websort (www.websort.net) into key concepts
- Assigned team members to review and create brief summaries of the key points of manuscripts
- Each section roughly corresponded to one of the framework key concepts
  - Human-computer interaction theories
  - Human factors theories
  - Human information processing
    - Information, representation, and visualization
    - Hardware - input/output technologies

Case Studies

- Best practice exemplars
- Challenging cases
  - Over 30 case studies received

- Two key factors for success or pain
  - Involvement of end users
  - Integration with existing systems

Case Studies: Success

- Two different health systems, each with multiple service lines
- System installation including order management, results and multidisciplinary documentation
- Both sites had learned from previous installations
- Clear vision & direction
  - Support all disciplines
  - CPOE
  - Evidence Based Practice
  - Clinical decision support at the point of care

Case Studies: Success

- Leadership connected and engaged
- Multidisciplinary team and leadership evaluated systems
- End users (multidisciplinary) involved in all processes
  - From system selection, to design, through testing and education starting with selection to ongoing system optimization
- Partnered with vendor

Case Studies: Success

- Testing: Extensively tested content and functionality by diverse team members
- Customized education sessions
  - Super users for training and support
  - CEUs for staff education and process not system-driven education
  - Rapid response to end-users
- On going investment in the system

Case Studies: Painful

- Peri-Natal Software Application
  - Multi-hospital system
  - Phased project over 3 months per site request
  - Interdisciplinary documentation and Order Management
- Direct device connections
  - Monitors, vents, pumps
- Vendor
  - New vendor project office and the first new site in more than 12 months

Case Studies: Painful

- Issues discovered during go-live due to lack of workflow analysis
  - Missing key pieces of documentation (ex. normal newborn, epidural insertion)
  - Missing order sets for normal vaginal delivery, C-section
- Go-live support- no site support available
- Equipment issues
  - Ordered equipment not all installed until during go-live
  - NICU vent interfaces did not work despite a checklist saying they did
- Responses
  - Providers – "I've used this system elsewhere. Why is it so different here?"

Case Studies: Painful

- Responses
  - CIO at the site
    - "Successful project"
  - Vendor leadership
    - "Successful project

Recommendations/Lessons Learned

- Usability is the fit between system users, their work and environments
- Imperatives include:
  - Engage end users early and often
  - Understand users, their tasks and their environments
  - Conduct usability testing and redesigning before implementation

Recommendation for Providers

- Management support
  - Involvement by all levels
  - An engaged executive sponsor
- Site engagement
  - Making usability a necessity
- Collaboration between
  - Management
  - Vendor
  - Staff (all departments)
- Have a clear vision of what a successful system design and implementation will look like – and share it early and often

Recommendation for Providers

- Systems must be owned by clinicians
  - NOT information technology (IT) departments or vendor
- Complete a workflow analysis for each user/department touching the electronic medical record
  - Including coding & billing
  - Focus on workflow improvement

Key Recommendations: Providers

- Include multidisciplinary teams
  - Interdisciplinary that designs/discusses all new functionality
- Engage users early and often:
  - Selection
  - Design
  - Testing – including usability, integration/interfaces and equipment
  - Use real life scenarios
  - Education
  - Support

Key Recommendations: Providers

- Budget for training
  - Too much training better than not enough
- Plan for support during live event:
  - Name of support person assigned and number
  - Like support like (L&D support L&D)
  - Negotiate for support (vendor if needed)
- Consider reporting capabilities of system
  - Clinicians need ability to locate, manipulate, and aggregate data quickly
  - Use of text fields should be used judiciously as it is extremely difficult and time consuming to codified and analyze
- Develop a standardized method for managing change
- Downtime procedures for multiple possible scenarios

Recommendations for Vendor Community

- Consider the requirements of different skill levels of practitioners
  - A novice nurse may need prompts more than an experienced nurse
  - Allow users to select their level of support and prompting
- Clinician representation on development teams
  - Clinicians as product managers
  - User involvement
    - Focus groups from multiple facilities types
      - Academic, community and rural

Recommendations for Vendor Community

- Assess usability early in development of a product
  - Actually DO usability testing
  - Do user observation and user teaching with several people on a team including clinicians with experience
- Understand the reasoning beyond the workflow
  - Generate innovative designs that can better meet user needs in surprisingly delightful ways
  - Use clinicians as observers – they can pick up nuances
- Have a consistent look and feel across all screens and applications
- Have a "narrative" view of points/clicks

Recommendations for Vendor Community

- Design needs to be clinician-driven
- Design with the end in mind: Make it easy to do the right thing/hard to do the wrong thing
  - Expect that users will still occasionally manage to do the wrong thing no matter how good the design or the user (you can't nurse proof it)
- Consider the environment in which the technology will be used
  - Location, temperature, surrounding objects, etc

Recommendations: Conclusions

- Clinical design is
  - Interdisciplinary
  - Evidence-based
  - Patient-centered
- Good usability is no longer a choice but a mandate to support safe, effective decision making
  - Informatics Nurse Specialists can be pro-active to educate others about usability
- Usability is
  - Understanding system users, their work, and environments
  - Including users early and often in the systems lifecycle
  - Redesigning the product to improve usability
  - Conducting systematic evaluations of the product

Usable Environments for Nurses Require:

- Increased nursing input into the design and implementation
  - To improve technology solutions
- Collaborating efforts of diverse organizations
  - To define crucial aspects for nurses
- Defining the key concepts and constructs of usability
  - And applying them to nursing-intense environments
- Providing recommendations for design and implementation
  - For various environments
- Developing a toolkit
  - To assist in the development and evaluation activities

Involvement and Integration Impact

- User acceptance and system adoption
- Accuracy
  - Fewer transcription errors when there is no duplicate documentation
- Improved patient safety due to synchronized, accurate information
- Improved timeliness of information collection, reporting and use of the information

American Academy of Nursing Calls for thoughtful development of Health IT

- The AAN in collaboration with the Robert Wood Johnson Foundations and other organizations has been instrumental in supporting efforts to improve how technology is developed and deployed to increase the amount of time nurses and other providers spend with patients
- One component, Technology Drill Down (TD2) provides medical/surgical units the opportunity to develop and improve their process and workflow inefficiencies by identifying technological solutions
  - www.aannet.org/files/public/facilitator.manual.pdf

TIGER lives on!

- For more information and to participate:

- The first summary report can be ordered from https://www.tigersummit.com/

- Workgroup details are found at http://tigerusability.pbwiki.com/