

Date: 12/19/2012

Title: Building bridges with real time clinical support for the electronic health record

**Clinical Question:**

- |                        |  |
|------------------------|--|
| P (Population/Problem) | Among hospital staff using an electronic health record (EHR) |
| I (Intervention)       | does 24/7 on-site technical/clinical support*                |
| C (Comparison)         | compared to off-site support                                 |
| O (Outcome)            | improve end-user/staff satisfaction* and care efficiency*?   |

[Definitions for terms marked with \\* may be found in the Supporting Information section.](#)

**Target Population for the Recommendation:**

Inclusion: Inpatient hospital staff, students and faculty who use an EHR

Exclusion: Outpatient/Ambulatory Staff

**Recommendation:** (See [Dimensions for Judging the Strength of the Recommendation](#))

There is insufficient evidence and a lack of consensus to make a recommendation on the use of 24/7 on-site technical/clinical support for improving end-user/staff satisfaction and care efficiency with the EHR.

**Discussion/Synthesis of Evidence related to the recommendation:**

No studies were found which compared 24/7 on-site support with off-site support.

The following evidence was found which does not answer the PICO question but informs it. Five studies using various conceptual models and hypothesis driven constructs speculate there is a positive relationship between end-user/staff satisfaction and technical/clinical support (Adam Mahmood, Burn, Gemoets, & Jaquez, 2000 [1b]; Bhattacharjee, & Hikmet, 2008 [4a]; Igbaria, 1990 [4a]; Lu, Hsiao, & Chen, 2012, Palm, Colombet, Sciotte, & Degoulet, 2006 [4b]). Further research is needed to test the concepts developed in the aforementioned studies.

Four studies using end-user/staff surveys found that proximity of technical/clinical support services and the quality of technical/clinical support services positively affected end-user/staff attitude and computer usage (Holden, 2011[2b]; Oroviogioechea & Watson, 2008 [4a]; Poe, Abbott, & Provonost, 2011 [4a]; Govindarajulu, Reithel, & Sethi, 2000 [4b]). These studies do not discuss the 24/7 aspect of support.

One meta-analysis found the use of organizational support including technical/clinical support was significantly related to end-user/staff satisfaction and computer usage (Adam Mahmood, Burn, Gemoets, & Jaquez, 2000 [1b]). The study did not address onsite availability of support.

One longitudinal study found improved end-user satisfaction related to technical/clinical support although availability of the support was not specified (Chilsom, Purnell, Cohen, & Sheck McAlearney, 2010 [4b]).

Studies found a strong correlation between technical/clinical support and the two constructs of ease of use\* and perception of ease of use\* although they did not specify whether the support was available 24/7. Both constructs have shown an effect on end-user/staff satisfaction with computer usage (Adam Mahmood, Burn, Gemoets, & Jaquez, 2000 [1b]; Holden, 2011 [2b]; Bhattacharjee, & Hikmet, 2008 [4a]; Igbaria, 1990 [4a]; Lu, Hsiao, & Chen, 2012, [4a]; Oroviogioechea & Watson, 2008 [4a]; Poe, Abbott, & Provonost, 2011 [4a]; Chilsom, Purnell, Cohen, & Sheck McAlearney, 2010 [4b]; Govindarajulu, Reithel, & Sethi, 2000 [4b]; Palm, Colombet, Sciotte, & Degoulet, 2006 [4b]).

**Reference List:** (Evidence Level in [ ]; See [Table of Evidence Levels](#))

- Adam Mahmood, M., Burn, J.M., Gemoets, L.A., & Jaquez, C. (2000). Variables affecting information technology end-user satisfaction: A meta-analysis of the empirical literature. *International Journal of Human Computer Studies*, 52, 751-771. [1b].
- Bhattacharjee, A., & Hikmet, N. (2008). Reconceptualizing organizational support and its effect on technology usage: Evidence from the health care sector. *Journal of Computer Information Systems, Summer*, 69-76. [4a].
- Chilsom, D. J., Purnell, T.S., Cohen, D.M., & Sheck McAlearney, A. (2010). Clinical perceptions of an electronic medical record during the first year of implementation in emergency services. *Pediatric Emergency Care*, 26 (2), 107-110. [4b].
- Govindarajulu, C., Reithel, B.J., & Sethi, V. (2000). A model of end-user attitudes and intentions toward alternative sources of support. *Information and Management*, 37, 77-86. [4b].
- Holden, R. (2011). What stands in the way of technology-mediated patient safety improvements? A study of facilitators and barriers to physicians' use of electronic health records. *Journal of Patient Safety*, 7 (4), 193-203. [2b].
- Igbaria, M. (1990). End-user computing effectiveness: A structural equation model. *OMEGA, International Journal of Management Science*, 18 (6), 637-652. [4a].
- Lu, C., Hsiao, J., & Chen, R. (2012). Factors determining nurse acceptance of hospital information systems. *CIN: Computers, Informatics, Nursing*, 00 (0), 1-8. [4a].
- Oroviogioioechea, C., & Watson, R. (2008). A quantitative analysis of the impact of a computerized information system on nurses clinical practice using realistic evaluation framework. *International Journal of Medical Informatics*, 78, 839-849. [4a].
- Palm, J., Colombet, I., Sciotte, C. & Degoulet, P. (2006). Determinants of user satisfaction with a clinical information system. *AMIA Symposium Proceedings*, 614-618. [4b].
- Poe, S., Abbott, P., & Provonost, P. (2011). Building nursing intellectual capital for safe use of information technology. A before-after study to test an evidence-based peer coach intervention. *Journal of Nursing Care Quality*, 26 (2), 110-119. [4a]

## IMPLEMENTATION

**Applicability Issues:**

This team did not consider applicability issues, due to no recommendation being developed.

**Relevant CCHMC Tools for Implementation:**

No CCHMC Tools for Implementation were found.

**Outcome or Process Measures:**

This team did not consider outcome or process measures, due to no recommendation being developed.

## SUPPORTING INFORMATION

**Background/Purpose of BES Development:**

With the advent of government requirements for Meaningful Use, hospitals are mandated to adopt and maintain an EHR. The correct documentation within the EHR requires the end-users/staff remain informed and updated on EHR changes. Keeping end-users up-to-date can be problematic as enhancements and updates to the EHR are an ongoing process. Research into the best technical/clinical support model is in its infancy. The state of the science is at a conceptual level with constructs and hypothesis being developed and tested using current informational systems theoretical frameworks.

**Definitions:**

**Care Efficiency:** The ability of the end-user/staff to deliver a course of treatment or produce an outcome in a safe, timely and effective manner

**Ease of Use:** The ability of an informational technology system to work effortlessly. The usability and learnability of an informational system

**End-User:** A person who utilizes the computer system

**End-User Satisfaction:** The degree to which the informational system meets the users' requirements for informational content, accuracy, output, format, ease of use and timeliness

**Perceived Ease of Use:** The degree to which a user feels the information technology system is effortless

**Perceived Usefulness:** The degree to which the user believes the informational technology system will enhance his/her job performance

**Technical/clinical support:** The availability of specialized personnel to answer user questions regarding information technology usage, troubleshoot emergent problems during actual usage and provide instructional and/or hands-on support to the users before and during usage

**Search Strategy:**

**Databases:** Medline, PubMed, CINAHL, The Cochrane Library/Cochrane Database for Systematic Reviews, Business Source Complete, Scopus, Google Scholar and a hand search

**Search Terms:** electronic medical record, electronic health record, clinical information system, clinical information technology, management information system, health information system, electronic patient record, nursing, nurses, doctors, providers, end-user, end-user satisfaction, end-using computing, satisfaction, support, end-user support, nursing informatics, informatics, health informatics technology, computers, peer coaching, super users

**Limits, Filters:** English language

**Search Dates:** 1990-2012

**Last Search Date:** 3/31/2012

**Relevant CCHMC Evidence-Based Documents:**

No relevant CCHMC guidelines or BESs were found.

**Group/Team Members:**

**Team Leader/Author:** Christina Kelly MSN, RN-BC, Clinical Systems Support Specialist

**Support/Consultant:** Barbara Giambra, MS, RN, CPNP, Evidence-Based Practice Mentor, Center for Professional Excellence/Research and Evidence-Based Practice

**Ad Hoc/Content Reviewers:** Mary A Meister MSN, RN-BC, Manager, Clinical Information Systems Support Team

**Conflicts of Interest were declared for each team member:**

- No financial or intellectual conflicts of interest were found.
- No external funding was received for development of this BEST.
- The following conflicts of interest were disclosed:

**Note:** Full tables of the [LEGEND evidence evaluation system](#) are available in separate documents:

- [Table of Evidence Levels of Individual Studies by Domain, Study Design, & Quality](#) (abbreviated table below)
- [Grading a Body of Evidence to Answer a Clinical Question](#)
- [Judging the Strength of a Recommendation](#) (dimensions table below)

**Table of Evidence Levels** (see note above):

Quality level	Definition
1a <sup>†</sup> or 1b <sup>†</sup>	Systematic review, meta-analysis, or meta-synthesis of multiple studies
2a or 2b	Best study design for domain
3a or 3b	Fair study design for domain
4a or 4b	Weak study design for domain
5a or 5b	General review, expert opinion, case report, consensus report, or guideline
5	Local Consensus

†a = good quality study; b = lesser quality study

**Table of Language and Definitions for Recommendation Strength** (see note above):

Language for Strength	Definition
It is strongly recommended that... It is strongly recommended that... not...	When the dimensions for judging the strength of the evidence are applied, there is high support that benefits clearly outweigh risks and burdens. <i>(or visa-versa for negative recommendations)</i>
It is recommended that... It is recommended that... not...	When the dimensions for judging the strength of the evidence are applied, there is moderate support that benefits are closely balanced with risks and burdens.
There is insufficient evidence and a lack of consensus to make a recommendation...	
<i>Given the dimensions below and that more answers to the left of the scales indicate support for a stronger recommendation, the recommendation statement above reflects the strength of the recommendation as judged by the development group. (Note that for negative recommendations, the left/right logic may be reversed for one or more dimensions.)</i>	
<b>Rationale for judgment and selection of each dimension:</b>	
<b>1. Grade of the Body of Evidence</b>	<input type="checkbox"/> High <input type="checkbox"/> Moderate <input type="checkbox"/> Low
<i>Rationale:</i>	
<b>2. Safety/Harm (Side Effects and Risks)</b>	<input type="checkbox"/> Minimal <input type="checkbox"/> Moderate <input type="checkbox"/> Serious
<i>Rationale:</i>	
<b>3. Health benefit to patient</b>	<input type="checkbox"/> Significant <input type="checkbox"/> Moderate <input type="checkbox"/> Minimal
<i>Rationale:</i>	
<b>4. Burden on patient to adhere to recommendation</b>	<input type="checkbox"/> Low <input type="checkbox"/> Unable to determine <input type="checkbox"/> High
<i>Rationale:</i>	
<b>5. Cost-effectiveness to healthcare system</b>	<input type="checkbox"/> Cost-effective <input type="checkbox"/> Inconclusive <input type="checkbox"/> Not cost-effective
<i>Rationale:</i>	
<b>6. Directness of the evidence for this target population</b>	<input type="checkbox"/> Directly relates <input type="checkbox"/> Some concern of directness <input type="checkbox"/> Indirectly relates
<i>Rationale:</i>	
<b>7. Impact on morbidity/mortality or quality of life</b>	<input type="checkbox"/> High <input type="checkbox"/> Medium <input type="checkbox"/> Low
<i>Rationale:</i>	

Copies of this Best Evidence Statement (BEST) and related tools (if applicable, e.g., screening tools, algorithms, etc.) are available online and may be distributed by any organization for the global purpose of improving child health outcomes.

Website address: <http://www.cincinnatichildrens.org/service/i/anderson-center/evidence-based-care/bests/>

Examples of approved uses of the BEST include the following:

- Copies may be provided to anyone involved in the organization's process for developing and implementing evidence based care;
- Hyperlinks to the CCHMC website may be placed on the organization's website;
- The BEST may be adopted or adapted for use within the organization, provided that CCHMC receives appropriate attribution on all written or electronic documents; and
- Copies may be provided to patients and the clinicians who manage their care.

Notification of CCHMC at [EBDMinfo@cchmc.org](mailto:EBDMinfo@cchmc.org) for any BEST adopted, adapted, implemented, or hyperlinked by the organization is appreciated.

Please cite as: Kelly, C., Cincinnati Children's Hospital Medical Center: Best Evidence Statement Building bridges with real time clinical support for the electronic health record, <http://www.cincinnatichildrens.org/svc/alpha/h/health-policy/best.htm>, BEST 150, pages 1-5, 12/17/12.

This Best Evidence Statement has been reviewed against quality criteria by two independent reviewers from the CCHMC Evidence Collaboration. Conflict of interest declaration forms are filed with the CCHMC EBDM group.

Once the BEST has been in place for five years, the development team reconvenes to explore the continued validity of the guideline. This phase can be initiated at any point that evidence indicates a critical change is needed. CCHMC EBDM staff performs a quarterly search for new evidence in an horizon scanning process. If new evidence arises related to this BEST, authors are contacted to evaluate and revise, if necessary.

*For more information about CCHMC Best Evidence Statements and the development process, contact the Evidence Collaboration at [EBDMinfo@cchmc.org](mailto:EBDMinfo@cchmc.org).*

#### **Note**

**This Best Evidence Statement addresses only key points of care for the target population; it is not intended to be a comprehensive practice guideline. These recommendations result from review of literature and practices current at the time of their formulation. This Best Evidence Statement does not preclude using care modalities proven efficacious in studies published subsequent to the current revision of this document. This document is not intended to impose standards of care preventing selective variances from the recommendations to meet the specific and unique requirements of individual patients. Adherence to this Statement is voluntary. The clinician in light of the individual circumstances presented by the patient must make the ultimate judgment regarding the priority of any specific procedure.**