

7.2b System Selection, Implementation, and Optimization

10x10 – Introduction to Biomedical Informatics & Artificial Intelligence
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System implementation (Sayles, 2023)

Site/space preparation and installation

User and system configurations

Testing

Training

Go-Live

Site/space preparation and installation

Selection of hardware and software – may be limited due to vendor requirements

Site preparation

- Physical location, especially for servers, with requirements for environment, security, accessibility, etc.
- Network issues – local, Internet (latter especially key if using hosted/ASP approach)
- Programming needs and requirements

User preparation

- Preparation for change
- Realistic expectations
- Adequate training

User and system configurations

Screen design

- While most systems come with many screens “out of the box,” may need to customize screens for different users, workflows, etc.

Report design

- Most systems come with “canned” reports but organizations usually want other elements
- Most systems export data to other programs

Interfaces

- Most systems will need to interface with other local systems (e.g., labs, practice management) but also health information exchange

Also important for configuration is patient safety

eSafety checklist (Dhillon-Chattha, 2018)

- Global Settings
- Patient Identification
- Clinical Documentation
- Order Management
- Clinical Decision Support (CDS)
- Medication Management
- Referral Management
- Result Management
- Clinical Communication
- Patient Portal

ONC/ASTP [Safety Assurance Factors for EHR Resilience \(SAFER\) Guides](#)

- Motivations (Sittig, 2014) and recent revisions (Sittig, 2025)
- Required attestation by CMS (Sittig, 2022)

Better certification for usability and safety (Ratwani, 2018)

Training and testing

Training (Kulhanek, 2022)

- Essential part of implementation
- Must balance time for training vs. absence from regular job
- Should treat as “adult learners”

Testing – need plan for testing all aspects of system

- Hardware, software, and interfaces
- Application meets requirements
- Documentation and training adequate
- “Volume” testing of many numbers and types of users

Go-Live

Official date and time that organization begins using system

Models for Go-Live

- Parallel – keep new and old systems running; very expensive
- Phased – add modules sequentially across organization
- Pilot – install full system in one unit at a time; may overlap (i.e., start in another location before finishing previous one)
- Big bang – all at once; has risks but has been used successfully with proper planning

Planning for Go-Live

- Adequate support for initial start and major changes, including 24x7
- Continued support “at the elbow” and via help desk

Documented benefits from STEPS Forward

Practice re-engineering

- Pre-visit lab ½ hr
- Prescription management ½ hr
- Expanded rooming/discharge 1 hr
- Optimize physical space 1 hr
- Team documentation 1-2 hr
- Total 3+ hr/day

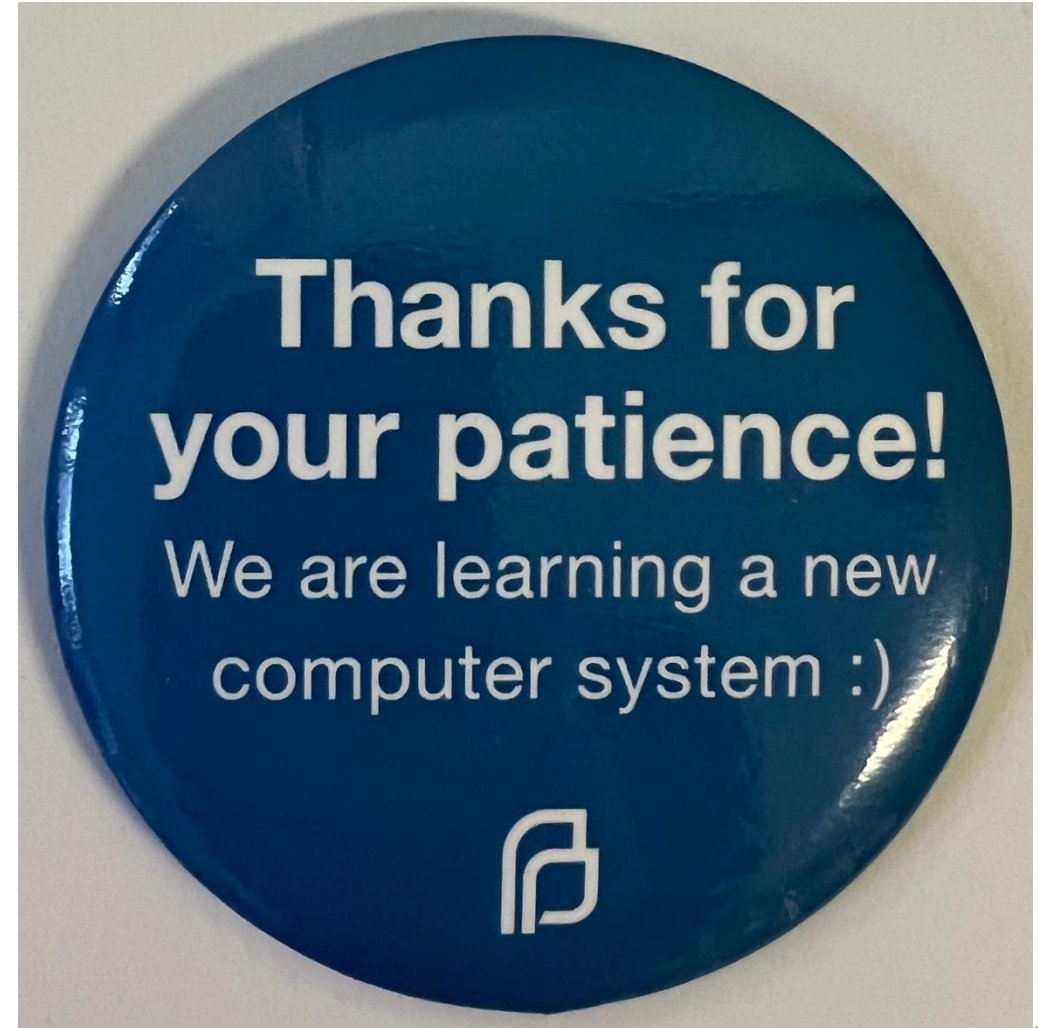
Some EHR-related time savings

- Printer in every room – 20 min
- Large monitor – 20 min
- RFID sign on – 17 min

Supporting users and patients

Aim to avoid “work after work” or “pajama time”

Support users, per Dr. Glaucomflecken



Other implementation issues

The right people – importance of

- “Special people” (Ash, 2003)
- “People skills” (Fenton, 2006)
- Informaticians (Hersh, 2010)

Consideration of all medical specialties, e.g.,

- Pediatrics (Webber, 2019; Dufendach, 2024)
- Obstetrics and gynecology (McCoy, 2010)
- Ophthalmology (Chiang, 2011)

Information governance – critical in organizations (Ravi, 2023; Scariati, 2023)

Driving innovation in organizations (Kawamoto, 2021)

Considerations beyond the EHR (Marwaha, 2023)

Implementing in developing countries (Tun, 2023)

Switching EHRs

62% have switched during career (Medical Economics, 2017)

Often but not exclusively involves transition from homegrown to commercial EHR (Johnson, 2018; Colicchio, 2021) or to major new version (Abramson, 2012)

Similar processes used for implementation useful for switching (Sittig, 2022; Bates, 2023)

- Key issues include data transition and usability (Weiner, 2023)

Some organizations use more than one EHR (Payne, 2012)

Challenges include personnel resources, patient safety threats from limited access to legacy records, data integrity during migration, cybersecurity, and semantic interoperability (Huang, 2020)

- Can persist beyond a year after transition (Molloy-Paolillo, 2023)

System optimization

Sprints, or intensive team-based interventions, to

- Optimize efficiency in clinic or office (Sieja, 2019; Chen, 2024)
- Improve user satisfaction in inpatient settings (Simpson, 2021)

Getting rid of “stupid stuff” – ongoing program at one health system to identify and improve documentation in three categories (Ashton, 2018)

- Never meant to occur and would require little consideration to eliminate or fix
- Needed but could be completed in a more efficient or effective way with newer tools or better understanding
- Required but for which clinicians did not understand requirement or tools available

Optimizing EHR – improving efficiency

Mobile EHR-connected application for managing team workflows in inpatient setting (Soegaard Ballester, 2021)

Using mobile laptops with modified rounding-in-flow associated with earlier completion of residents' work (Balch, 2022)

Helping physicians reduce note length and time in composing them (Apathy, 2022)

Another get rid of stupid stuff (GROSS) approach allowed clinicians to submit suggestions that were reviewed and implemented when possible (Hamel, 2023)

Reserving 1 appointment slot per half-day for EHR work reduced after-hours and non-workday EHR use, reducing burnout, and with only a small decrease in productivity (Kanaparthi, 2025)

AI agents (Jiang, 2025; McElfresh, 2025)?

Roadmap for EHR optimization and clinician well-being (Shah, 2020)

Electronic Health Record (EHR) Optimization “Sprints” and Work Design Approaches: establishing a team of experts that meets with clinicians to provide peer training for increased efficiency and to create useful shortcuts, specialty-specific tools, and note templates within the EHR. Specific examples include routing prescription refill requests to medical assistants (MAs) rather than directly to physicians and a collaborative culling of unnecessary or poorly defined workflows or documentation requirements.

In-Basket Management Techniques: routing messages to team members who can take action rather than all messages to the physician first, creating best practices to reduce e-mail volume, reducing notification volume, and creating educational modules to re-vamp EHR workflows.

Documentation Strategies and Team-Based Workflow: increasing the use of medical scribes and increasing the use of team-based care by supplementing physicians with nurses and MAs who can assist with administrative tasks.

EHR Training: delivering high-quality “at-the-elbow” training on the EHR during implementation and at regular intervals afterward, teaching best practices up front so there is no need to “un-learn” workarounds, and protecting time for clinicians to take part in these trainings.

Artificial Intelligence (AI) and “Add-On Apps”: identifying and evaluating the potential of AI-supported “digital scribes,” evaluating the efficacy and specificity of using AI to support clinical decision making, and identifying helpful add-on apps that can increase EHR efficiency and function.

Provider builder maturity model

For participation in design (Liang, 2025)

Stage	Description
0: Planting the Seed	• No provider builders. • IT unfamiliar, likely reticent to give access to providers
1: Lone Wolves	• Few provider builders, mostly volunteer • Individualized access and management • Informal knowledge-sharing
2: Community of Builders	• Several provider builders, mostly volunteer • Established access procedures with graduated responsibility • Regular, coordinated knowledge-sharing
3: Organizational Investment	• Standards for provider builder protected time from IT, division, and/or department • Established metrics for program success
4: Council of Builders	• Many builders; some have protected time • Defined skill levels associated with access, mentorship, and build oversight plans • Structured knowledge-sharing via educational materials and didactic conferences • Tracking system for provider builder project progress and outcomes
5: Informatics in the Room Where it Happens	• Cadre of supported informaticists embedded in strategic roles • Partnerships between data analysts, informatics, quality, clinical operations, and research to enable a learning health system

Other approaches?



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