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META-ANALYSIS OF CONTINUOUS IMPROVEMENT EFFICACY: VERSUS PAPER AND COMPARATIVE EMRS

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Introduction: Since the IOM's "To Err Is Human", and other indicting publications, continuous improvement methodologies have become commonplace throughout healthcare. Quantified successes include improvements in clinical outcomes, efficiency, satisfactions and cost-per-case. Also noteworthy, proliferation near-ubiquity of EMRs, promising improved outcomes beyond code-capture and info-storage alone. However, all EMR vendors have not provided rigorous proof of EMRs enabling impactful continuous improvement beyond paper-alone, or comparatively versus other EMR designs. Are there EMR characteristics for comparatively greater continuous improvement capabilities?

Methods: Meta-analysis included 16 matched organisations: Four for three contrasting EMR designs/approaches, four paper-based non-EMR. Data included 6-month pre-EMR baselines versus 24-month post-implementation. All organizations leveraged interchangeable high-value methodologies (6-Sigma, Lean). Catheter associated urinary tract infections (CAUTIs) represented the only undertaking universal in the 16. One statistician with SPSS and SAS did all analyses.

Results & Interpretations:
Comparative gains versus baselines (each $p<0.001$):
- Non-EMR achieved 5.3% improvement by 6-months, 8.2% by 24.
- Compliance-focused, non-programmable EMRs: 4.9% 6-months, 29.1% 24, plateauing by 20-months.
- Somewhat-programmable EMRs: 17.2% 6-months, 56.4% 24, no plateauing.
- Locally programmable/adaptable EMR: 29% 6-months, 87.2% 24, no limitations for improvement thereafter: no plateauing.

Conclusions & Discussion: EMRs are superior to paper-based alone for continuous improvement. EMR characteristics determine the magnitude and speed of continuous improvement, as well as apparent long term limitations (i.e. plateauing). Some EMRs resulted in 10-times the improvement versus other EMRs, and never plateaued. Key EMR characteristics determine efficacy and magnitude of continuous improvements. Review of those characteristics is crucial to considering optimal design and capabilities for healthcare organizations.

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XACML-BASED SECURITY DESIGN PATTERNS FOR CLINICAL RESEARCH

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As web-based applications and services grow in size and complexity, traditional access control solutions based on the preliminary identification of users become inadequate for enforcing access control. This is the case in a clinical research environment where web service applications are often distributed and contain sensitive information. The increasing challenges to achieve specific information security goal such as fine-grained authorisation, confidentiality, integrity and non-repudiation may result in security vulnerabilities if not addressed. However, by applying best practice solutions, we demonstrate the use of security design patterns to describe reusable solutions to recurring security issues in clinical research. In this paper, we focus on the composition of clinical access control policies to enhance the authorisation flow of the AndroPhenome project at the University of Birmingham. The work exploits the extensible Access Control Markup Language (XACML) syntax to define the clinical security policies. To eliminate or mitigate the consequences of security vulnerabilities associated with access control, the constructs of the XACML policy elements including combining algorithms and obligations are used to deliver specific security features through a policy enforcement point (PEP) and policy decision point (PDP).

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