Financial Disclosures

• Kyle Smith, MD
  – Chief Medical Officer - Integrity Digital Solutions

• No other individual have proprietary or commercial interest in any of the materials discussed
Overview

1. Background
2. Purpose
3. Design
4. Methods
   A. Efficiency
   B. Productivity
5. Results & Discussion
   A. Efficiency
   B. Productivity
   C. Study Comparison
6. Conclusions
Background

- Healthcare Demands
  - Documentation
  - Evidence-Based Practice
  - Information Exchange
    - Provider – Health Plans – Patients

- Technology and Software Development
  - Transforming business, communication, healthcare
Background

• Continued development and implementation is arguably the best potential to improve the delivery, quality, and efficiency of healthcare\textsuperscript{1}

• Institute of Medicine Response
  – EHRs are essential for improving safety, quality, and efficiency of healthcare\textsuperscript{2,3}
Background

• Adoption and Implantation delays
  – 2008 AAO Survey\(^4\)
    • 12% member adoption
      – 69% user satisfaction
      – 64% stable productivity
      – 51% stable costs
    • 17% in the process or intended implementation within 1 year

  – HITECH Act of 2009\(^5,6\)
    • Financial incentives ($27 billion) for “meaningful use”
    • Eventual penalties for non-adoption
    • Goal: 85% adoption by healthcare entities over 5 years

– 2013 AAO Survey\(^7\)
  • 32% member adoption
    – 49% user satisfaction
    – 42% Stable productivity
    – 19% decreased or stable costs
  • 31% in the process or intended implementation within 2 years
Background

• **Ophthalmologist Concerns**\(^1,3,4,8-11\)
  – Medical Error
  – Workflow Limitations
  – Drawing Capabilities
  – Special Testing

• **Chiang MF, et al. 2013**\(^3\)
  – Clinic Volume
    • ↓12% after first 3 months
    • ↓7% after 1 year
    • ↓3% after 2 and 3 years
  – Costs
  – Efficiency
  – Learning Curve
  – Documentation Quality

  – Documentation Time
    • ↑6.8 minutes with EHR
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Purpose

• Impact of Implementing an Eye-Specific EHR
  – Clinic Efficiency (Time Consumption)
    • Technician Encounter Times
    • Provider Encounter Times
  – Clinic Productivity (Revenue Generation)
    • Relative Value Units (RVUs) Billed
    • Encounter Volumes
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Study Design

• Efficiency Study
  – Comparative, prospective, observational study

• Productivity Study
  – Comparative, retrospective study
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Methods

• Scott & White Eye Institute (Temple, TX)
  – Large, academic, multi-specialty group practice

• Integrity EMR for Eye (Belton, TX)
  – Certified, Eye-Care Specific, Web-based EHR

• Implementation
  – Select providers July 2011
  – Full department July 2012
Methods: Efficiency

- 2 Third-Party Observers
- Encounter Timing Program
  - Microsoft Access (Redmond, WA)
  - Touch/Click interface
- Measurements
  - Technician Encounter Times
  - Doctor Encounter Times
Methods: Efficiency

Encounter Recording Program on Microsoft Access
**Methods: Efficiency**

**Total Technician Time**
- **Documentation Time (TDT)**
  - Time spent preparing and documenting in patient chart while not in exam room
- **Patient Time (TPT)**
  - Time spent in the exam room

**Total Technician Time** = **TDT** + **TPT**

**Total Doctor Time**
- **Documentation Time (DDT)**
  - Time spent documenting and completing the patient chart while not in exam room
- **Patient Time (DPT)**
  - Time spent in the exam room

**Total Doctor Time** = **DDT** + **DPT**
Methods: Efficiency

• Tracking Times
  – No observer – patient interaction
    • One observer tracking multiple encounters
  – No loss of data due to irregular patient work-up
    • i.e. Visual Field technicians
      – No technician times
      – Doctor times remain valid
  – Allows for comparisons among different documentation practices
    • Pre-visit Charting, Visit Charting, Post-visit Charting
Methods: Efficiency

• Timeline
  – Pre-EHR = Paper documentation
  – 4 Months after implementation
  – 18 Months after implementation
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Methods: Productivity

• Clinic RVUs
  – Clinic Encounters and Procedures
  – No Surgical (OR) Encounters

• Clinic Encounters

• Clinic Days Worked
  – Accounts for vacations, holidays, OR days
Methods: Productivity

• Timeline
  – Same 4 Consecutive Months at each point
    • November – February

  – Comparison of normal fluctuations
    • Vacations (Provider, Patient)
    • Holidays

  – Helps minimize potential errors
Methods: Productivity

• Timeline
  – Pre-EHR = Paper documentation
  – 6 Months after implementation
  – 18 Months after implementation
Methods

• Primary Outcome Measures
  – Clinic Efficiency (Time Consumption)
    • Total Technician Time
    • Total Doctor Time

  – Clinic Productivity (Revenue Generation)
    • RVUs per Day Worked
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Results: Efficiency

• 871 patient encounters
  – Pre-EHR: 306
  – 4m-EHR: 241
  – 18m-EHR: 324

• 6 Providers
  – 2 Comprehensive Ophthalmology
  – 1 Glaucoma, Neuro-opthalmology, Oculoplastic
  – 1 Optometrist
## Results: Efficiency

<table>
<thead>
<tr>
<th></th>
<th>Pre-EHR</th>
<th>4m-EHR</th>
<th>18m-EHR</th>
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<tbody>
<tr>
<td>A</td>
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<td>306</td>
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</tr>
</tbody>
</table>
Results: Efficiency

Total Technician Time by Encounter Type

* Significant
Results: Efficiency

Total Technician Time by Provider

* Significant

[Bar chart showing total technician time by provider, with significant differences marked by asterisks.]
Discussion: Efficiency

• Total Technician Times
  – Overall averages
    • Paper – 18.5 minutes
    • 4m EHR – 15.7 minutes (-14.9%, p=0.004)
    • 18m EHR – 15.9 minutes (-13.8%, p=0.0024)

  – No Significant Increases in time for providers or encounter types
    • 2 different providers’ technicians had significant decreases in average times at both time points
      – B: -39.6% (4m) and -44.7% (18m)
      – D: -50.6% (4m) and -49.1% (18m)
Results: Efficiency

Total Doctor Time by Encounter Type

<table>
<thead>
<tr>
<th>Encounter Type</th>
<th>Paper</th>
<th>4m EHR</th>
<th>18m EHR</th>
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<tbody>
<tr>
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<td>Post-Op</td>
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<td>4</td>
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</tr>
</tbody>
</table>
Results: Efficiency

Total Doctor Time by Provider

* Significant

Time (Minutes)

A  B  C  D  E  F
Paper  4m EHR  18m EHR
Discussion: Efficiency

• Total Doctor Times
  – Overall averages
    • Paper – 13.1 minutes
    • 4m EHR – 10.5 minutes (-19.9%, p=0.0102)
    • 18m EHR – 11.5 minutes (-12.8%, p=0.0643)

  – No Significant Increases in time for providers or encounter types
    • 1 provider had significant decreases in average times at both time points
      – E: -50.2% (4m) and -36.1% (18m)
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Results: Productivity

Encounters / Provider

<table>
<thead>
<tr>
<th>Provider</th>
<th>Paper</th>
<th>6m EHR</th>
<th>18m EHR</th>
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Results: Productivity

Days Worked / Provider

* Significant

Days

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</table>

Legend:
- **Black**: Paper
- **Light Blue**: 6m EHR
- **Red**: 18m EHR
Results: Productivity

RVUs / Provider

* Significant

RVUs

A  B  C  D  E  F

Paper  6m EHR  18m EHR

* Significant
Discussion: Productivity

• Basic Productivity Values
  – No significant difference in encounter numbers
    • Individually or Combined
  – Only Provider F had significant changes in days worked (-19.4%) or RVUs (-26.4%)
    • Both at 18m
    • No significant change of RVUs/Day Worked
Results: Productivity

• Work flow and Volume
  – Monthly Encounter impacting variables:
    • Frequency of work (OR, Vacation, Holiday)
    • Speed of Technicians
    • Speed of special testing
    • Speed of provider

  – Encounters per Day Worked
    • Adjusts for frequency of work
Results: Productivity

Encounters / Day Worked

* Significant

Encounters

A  B  C  D  E  F

Paper  6m EHR  18m EHR
Results: Productivity

• Encounters per Day Worked
  – No significant decreases at 6m or 18m
    • Individual Provider or Combined
  – One provider had significant increase at 18m
    • D: 16.2% increase
Results: Productivity

• Provider Daily Revenue
  – Monthly impacting variables:
    • Frequency of work (OR, Vacation, Holiday)
    • Complexity and Type of Patient encounters
  – RVUs per Day Worked
    • Adjusts for frequency of work
Results: Productivity

RVUs / Day Worked

* Significant

<table>
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<tr>
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</table>
Results: Productivity

- RVUs per Day Worked
  - No significant decreases at 6m or 18m
    - Individual Provider or Combined
  - 3 providers had significant increases at 18m
    - C: 12.7% increase
    - D: 27.8% increase
    - E: 22.5% increase
Results: Productivity

• Billing Habits
  – Coding ability determined by encounter
    • History, Examination, Medical Complexity
  – Would not expect change due to EHR
Results: Productivity

RVUs / Encounter

* Significant

<table>
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<th>RVU</th>
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</table>
Results: Productivity

• RVUs per Encounter
  – No significant decreases at 6m or 18m
    • Individual Provider or Combined
  – One provider had significant increase at 18m
    • E: 25% increase

– Changes
  • Possible Coding Engine Coaching
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Study Comparison

• Chiang MF, et al.³
  – Documentation Time Methods:
    • Measured time encounter opened until closed
    • Small comparison for providers using both
      – Self logged times

  – Results:
    • EHR averaged 6.8 minutes longer (p<0.01)
    • Range: Minutes to Weeks
Study Comparison

• Chiang MF, et al.\(^3\)
  – Volume Methods:
    • 3 months prior (paper) vs 3 years after EHR
  
  – Results:
    • 12% Reduction at 3 months
    • 7% Reduction at 1 year
    • 3% Reduction at year 2 and 3

• High Volume Clinic (>100/m) - ↑6.7 per quarter
• Low Volume Clinic (<100/m) - ↓3.7 per quarter
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Conclusions

• EHRs are becoming standard part of medicine

• Implementation Incentives and potential penalties for lack of implementation

• Many provider concerns for possible negative impact of EHRs

• Lack of research on EHRs in ophthalmology
  – Even fewer looking at impact on clinics
Conclusions

• Our Study:
  – No significant decrease in efficiency or productivity with implementation of our EHR
    • Individual user dependent
  – Provides practical assessment for EHR impact:
    • Technicians and Providers Encounter times
    • Daily clinic revenue changes
    • Possible modifications of billing practices
Conclusions

• We hope that our paper presents valid measures to assess the true impact of EHR implementation of clinic efficiency and to encourage future studies which objectively and accurately evaluate the impact of electronic health records on clinical practice.
References


