Building a Connected Strategy: From Customer Experience to Technology Platforms

Fall Conference, Philadelphia, 2016
Combination of
- Reading
- Videos
- Problem sets

Helps students by directing them back to the appropriate content in the book

Helps professor by:
- Providing feed-back where students struggle
- No more grading
PCP Visit
1 year
PCP Visit
1 year
PCP Visit
1 year
PCP Visit
1 year
PCP Visit
1 year
PRESCRIPTIONS NOW AVAILABLE IN YOUR INBOX

The region’s first patient-accessible, online health records.

Easy and secure digital access to the information you need most – whenever you need it – test results, referrals, refills, appointments and more.

Access your test results
No more waiting for a phone call or letter — view your results and your doctor’s comments within days.
Welcome to JeffConnect, a service that 'connects' you with our doctors — anytime, anywhere — through your phone, tablet or computer. We use the latest video conferencing tools to deliver real-time care and consultation, virtually, at a time and location convenient for you.

SIGN UP >
Already have an account? Log In >

Download the JeffConnect app:

We offer a variety of virtual services through JeffConnect:

**FOR PATIENTS**

**On-Demand Virtual Care**
Jefferson emergency medicine physicians are available 24/7 through On-Demand Virtual Care. You can connect with our doctors anytime, anywhere, when you don't want to go somewhere to see a doctor.

READ MORE >

**Scheduled Online Visits**
Through video conferencing technology, patients and clinicians connect virtually to discuss recovery progress after procedures or illnesses, and address other important information related to patient care.

**Remote Second Opinion**
People who have been seen and diagnosed by their own physician can request a second opinion from a Jefferson physician without having to travel to Philadelphia, Pennsylvania.

READ MORE >
Best Health And Fitness Apps
What is the Pattern Here?

The old way  The Internet Way  The New Way

Student reading

Personal health

⇒ Increase in “smart devices” and “connectivity”
Goal of this Conference:
Understanding Connected Strategies

Customer Experience

Business model / service delivery model

Technology platform
Enabling technology
Innovations in Service Delivery Models: Reimagining Primary Care*

Christian Terwiesch

*This presentation is based on research with Hessam Bavafa, Lorin Hitt, Steve Marcus, and the VA team at the Center for Evaluating Patient Aligned Care Teams (CEPACT). Support from CEPACT, PennMedicine, and LDI is gratefully acknowledged.
Traditional Care Delivery Model: Episodic Care Based on Fixed Revisit Intervals & Urgent Care Appointments

**Physician / Provider**
Choose a revisit interval based on the health condition of the patient
Paradigm of an “inspection policy”

**Patient**
See your doctor as scheduled
In case of emergency, call the practice or go to the ER
Study 1: Looking for Improvement Potential: A Time and Motion Study for the Current Work of a PCP

Based on a video-ethnography of 121 provider patient encounters in the VA

<table>
<thead>
<tr>
<th>Time [min]</th>
<th>Activity</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>Patient enters</td>
</tr>
<tr>
<td>1</td>
<td>Pt asks about glucose levels and insulin shot levels</td>
</tr>
<tr>
<td>2</td>
<td>Dr. looks up prescription information on pc</td>
</tr>
<tr>
<td>3</td>
<td>Dr calls pt's caregiver to consult about pt's insulin medication</td>
</tr>
<tr>
<td>11</td>
<td>Dr discusses possibility of signing pt up for diabetes management</td>
</tr>
<tr>
<td>12</td>
<td>Dr discusses getting the pt glucagon</td>
</tr>
<tr>
<td>14</td>
<td>Dr/off phone, on computer</td>
</tr>
<tr>
<td>15</td>
<td>Dr asks pt about any low blood sugar history</td>
</tr>
<tr>
<td>16</td>
<td>Dr explains to pt how to store new meds</td>
</tr>
<tr>
<td>17</td>
<td>Dr/on computer, prints something</td>
</tr>
<tr>
<td>19</td>
<td>Dr gives patient printout of medication information</td>
</tr>
<tr>
<td>20</td>
<td>Pt asks Dr to make consult for liver ultrasound</td>
</tr>
<tr>
<td>21</td>
<td>Dr puts in liver ultrasound and pharmacy consultation</td>
</tr>
<tr>
<td>21</td>
<td>Dr/on computer</td>
</tr>
<tr>
<td>25</td>
<td>Dr briefly examines pt</td>
</tr>
<tr>
<td>26</td>
<td>They discuss pt's weight and exercise</td>
</tr>
<tr>
<td>27</td>
<td>Dr goes through meds</td>
</tr>
<tr>
<td>27</td>
<td>Dr/on comp</td>
</tr>
<tr>
<td>28</td>
<td>Dr orders blood work to watch sugar &amp; reschedules ultrasound</td>
</tr>
<tr>
<td>29</td>
<td>Dr/on computer</td>
</tr>
<tr>
<td>30</td>
<td>Dr examines pt briefly again</td>
</tr>
<tr>
<td>31</td>
<td>Pt leaves</td>
</tr>
</tbody>
</table>

PCP Visit

1 Mo.

PCP Visit

1 Mo.

PCP Visit

1 Mo.

PCP Visit

1 Mo.

PCP Visit

1 Mo.
Study 1a: Looking for Improvement Potential: A Time and Motion Study for the Current Work of a PCP

Average visit length: 22.9 minutes per visit

Source: Jennifer Gutierrez, Christian Terwiesch, Mary Pelak, Amy Pettit, Steven Marcus, “Characterizing Primary Care Visit Activities at Veterans Health Administration Clinics”, Journal of Healthcare Management, Jan/Feb 2015
Study 1b: Redesigning the Care Delivery Process

Each of the videos broken up into “episodes”

Each episode categorized in the following matrix

<table>
<thead>
<tr>
<th>Onsite</th>
<th>Remotely</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Doctor</strong></td>
<td><strong>Extender</strong></td>
</tr>
</tbody>
</table>
| Status quo | PCP extender onsite  
Example: patient education, discuss weight loss |
| Emails and follow-up calls  
Example: “Do you want to come in for your follow-up appointment or talk on the phone?” | PCP extender calls  
Example: “do you need refills of certain medications?” |

⇒ What distribution over these four cells would you expect?

⇒ Allocation done by an expert panel of three primary care providers with VA experience
Only Half of the Work Needs to Happen “The Old Way”

Little variation across practices can be explained by the usage of PCMH

Suggests a different delivery models with an emphasis on remote access

Source: Mary Pelak, Amy Pettit, Jennifer Gutierrez, Christian Terwiesch, Steven Marcus, “Rethinking Primary Care Visits: How Much Can Be Eliminated, Delegated, or Performed Outside of the Face-to-Face Visit?”, *Journal of Evaluation in Clinical Practice*, Vol. 21, August 2015
Can we Rethink Primary Care Emphasizing Email Encounters?

**Traditional Office visits**
Regular encounters, initiated by a scheduled revisit on an emergency visit

**Alternative 1: Virtual Office visits**
Patient can reach the provider via a portal; messages can be exchanged
Potential use of a physician extender
Alternative 2: Check lists, health-loops
Patient is given a set of milestones; follow-up with provider only needed in case of an exception
Milestones can be automated and be pushed out to the patient

Alternative 3: Automated hovering
Continuous time monitoring of the patient (or, at least daily)
Requires some degree of automation in interpreting the data
Example at PennMedicine: Patient portal allows for easy access without appointment or office visit

**Physician / Provider**
Choose a revisit interval based on the health condition of the patient
You know that the patient can reach you as needed, so most likely, choose longer interval

**Substitution effect**

1.5 Mo.  
P CP Visit e-Visit PCP Visit e-Visit PCP Visit e-Visit PCP Visit

**Patient**
See your doctor as scheduled
In case of emergency, call the practice, go to the ER, or use the patient portal
**Goal of the Present Study**

**Prior Research**
Kaiser Permanente: 6.7% decrease in office visits, 13.7% decrease in phone visits, 2-6.5% improvement in HbA1c outcomes / screening

*Source: Zhou et al, AJMC 2007*

**Specific Research Goals**
How does the usage of patient portals (in the case of MyPennMedicine) impact the frequency of office and phone encounters as well as the health of the patient?

Overcome methodological shortcomings of prior work
Study 2: Archival Analysis of PennMedicine Data to Find the Effect E-visits Have on Traditional Encounters

Practices include Media, Bucks County, Cooper, 3701 Market, Radnor, Penn Center for Primary Care, Penn Family Care, St Leonard’s Court, Bala Cynwyd

2008-2013Q1

All primary care visits: 2.5M encounters (office visits, telephone visits, e-visits)
   51,169 e-visits

Sample Construction
   143,256 unique patients
   Include only patients with continuous care => 65,282 patients
Distribution of days between office visits

Can we explain some of this variation via the usage of MyPennMedicine?

Does the e-Visit Adoption Predict the Number of Visits?

- **Patient #1**
  - Before Adoption: e-Visit=0
  - After Adoption: e-Visit=1

- **Patient #2**
  - Before Adoption: e-Visit=0
  - After Adoption: e-Visit=1

**Timeline:**

- 2008
- 2009
- 2010
- 2011
- 2012

**Diagram:**

- e-Visit Adoption
- Number of Visits
Before and after analysis on adoption shows reduction in the number of office visits
Analysis 1: Significant reduction in the number of office visits

<table>
<thead>
<tr>
<th></th>
<th>OLS (Adopters Only)</th>
</tr>
</thead>
<tbody>
<tr>
<td>e-Visit Adoption</td>
<td>-0.02***</td>
</tr>
<tr>
<td></td>
<td>(0.002)</td>
</tr>
<tr>
<td>Adoption Month</td>
<td>0.19***</td>
</tr>
<tr>
<td></td>
<td>(0.004)</td>
</tr>
<tr>
<td>Observations</td>
<td>347,993</td>
</tr>
<tr>
<td># Patients</td>
<td>7,409</td>
</tr>
</tbody>
</table>

Standard errors in parentheses
* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

MonthlyVisits$_{it} = \alpha \cdot eVisit$_{it} + \beta \cdot AdoptionMonth$_{it}$
+ patient$_i$ + provider$_{it}$ + month$_t$ + year$_t$ + $\epsilon$_{it}
Problems with Analysis 1

Patients vary in their level of adoption and usage of MyPennMedicine

Three groups of adopters

<table>
<thead>
<tr>
<th>Inactive Adopters</th>
<th>1,680</th>
<th>Adopted and never used it again</th>
</tr>
</thead>
<tbody>
<tr>
<td>Passive Adopters</td>
<td>1,872</td>
<td>Sent fewer than 4 messages per year (below median)</td>
</tr>
<tr>
<td>Active Adopters</td>
<td>1,789</td>
<td>Sent more than 4 messages per year (above median)</td>
</tr>
</tbody>
</table>

Goal of Analysis 2: stratify the effect of adoption by adoption intensity
Analysis 2: Active Adopters and Inactive Adopters are Identical Before Adoption Date But Differ Afterwards
Analysis 2: suggests that Active adopters of e-visits use more office visits

<table>
<thead>
<tr>
<th></th>
<th>Office Visits</th>
</tr>
</thead>
<tbody>
<tr>
<td>POST</td>
<td>-0.189*** (0.0165)</td>
</tr>
<tr>
<td>POST × PASSIVE</td>
<td>0.059*** (0.0189)</td>
</tr>
<tr>
<td>POST × ACTIVE</td>
<td>0.125*** (0.0168)</td>
</tr>
<tr>
<td>Adoption Month</td>
<td>0.741*** (0.0123)</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>Observations</td>
<td>537,182</td>
</tr>
<tr>
<td># Patients</td>
<td>10,507</td>
</tr>
</tbody>
</table>

Standard errors in parentheses
* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

\[
\text{MonthlyVisits}_{it} = \gamma_0 + \gamma_1 POST_{it} + \gamma_2 POST_{it} \times PASSIVE_{i} + \gamma_3 POST_{it} \times ACTIVE_{i} + \theta \cdot AdoptionMonth_{it} + patient_i + provider_{it} + month_t + year_t + \epsilon_{it}
\]
Conclusion

Our results suggest that e-visits increase frequency of on-site patient-provider interactions.

Similar results obtained for telephone encounters.

No measurable effects on patient health.

Too much connection is not always a good thing.

Importance of reimbursement setting.