Standardizing the Patient Visit Process – A Lean Six Sigma Case Study in Healthcare

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University of Houston

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Agenda

- Methodology
- Organization background
- Case study
- Results
- Next steps
What is Lean Six Sigma?

- Business philosophy
- Process improvement/excellence approach
- Structured problem-solving process
- Fact-based, data-driven decision making methodology
Christ Clinic

- Non-profit healthcare clinic in Katy, TX
- Funded by sponsorships & grants
- Serves uninsured, low-income adults
- Accepts patients with or without an appointment
- Seeking to improve patient care by standardizing the patient visit process
## Mapping the Process

<table>
<thead>
<tr>
<th>Suppliers</th>
<th>Inputs</th>
<th>Process</th>
<th>Output</th>
<th>Customers</th>
</tr>
</thead>
</table>
| Community (hospitals, outreach events, etc.) | Patients, AthenaNet (electronic medical record system), Healthcare Providers (physicians), Medical Assistants (nurses, etc.), Volunteers, Christ Clinic staff, Medical supplies | 1. Patient checks-in  
2. Fill-in super bill  
3. Record vitals  
4. Conduct patient exam  
5. Update super bill  
6. Order tests/labs, if needed  
7. Patient checks-out | Medical treatment  
Updated super bills  
Updated patient records in AthenaNet  
Payment from patients  
Application for “Gold Card,” if needed | Patients, Christ Clinic staff, Healthcare Providers, Medical Assistants, Harris County Partner Clinics |

Gold Card – Medical financial assistance program for low-income Harris County residents
Setting the Baseline

Average/mean: 74.8 min.
Sample size: 5,435 patient visits
Standard deviation: 36.8 min.
Time period: 7 months (7/2016-1/2017)

Average = 74.8 min.
Defining the Project

• Problem statement
  – Christ Clinic’s patient visit duration has averaged 74.8 min. with a standard deviation of 36.8 min. over the past 7 months (7/2016-1/2017), resulting in reduced quality of patient care.

• Mission statement
  – Reduce the patient visit duration to 60 min. or less with a standard deviation of 30 min. or less over the next 5 months (by 5/2017), resulting in improved quality of patient care.
Swim-lane Diagrams

- Simplified version of a basic flowchart
- Documents the “who” in “who does what?”
- Formats tasks into lanes for each role/responsibility
Christ Clinic Patient Visit Process

Patient with appointment check-in (p. 1)

1. Fill in "Patient Information" form
2. Fill in "Annual Update Patient Information" form

- **Tax returns, 3 current pay stubs, letter from employer or bank statements;** From the patient’s profile on a sticker

- Enter clinic
- Ask for patient name
- Find appointment?
  - Yes: Ask for patient DOB
  - No: Double check/update patient information
- New patient?
  - Yes: Fill in "Patient Information" form
  - No: Double check/update patient information
- Does patient have income?
  - Yes: Collect patients "Proof of income"*
  - No: Collect proof of income* from caretaker and a letter stating the same
- Annual patient info. update?
  - Yes: Fill in "Annual Update Patient Information" form
  - No: Check proof of income
- Verify patient information and appointment details
- Click "Done with check-in"
- Fill out super bill (manually)
- Put super bill in physical drop box
- Go to p. 2
- Is next patient waiting in clinic?
  - Yes: Search patient ID (patient waiting for no show)
  - No: Is patient waiting for no show?*
- Is patient waiting for no show?*
  - Yes: Select the appointment to be cancelled
  - No: Click "Cancel or reschedule appointment" and select "Patient no-show"
- Search patient ID (patient waiting for no show)
- Go to "Scheduling", select "Schedule an appointment"
- Select provider
- Click "Create new slot" & Fill in information (provider, appointment type, time, etc.)
- Click "Add appointment" & begin patient check-in
- End of day?
  - Yes: Have to file paperwork?
  - Yes: Generate barcode** and attach to the files
  - No: Scan and upload to Athena
  - No: No further action required

Patient cycle time = check-out time – check-in time; Athena – Electronic Health Records System; Dashed line indicates a break in the process

*Tax returns, 3 current pay stubs, letter from employer or bank statements; **From the patient’s profile on a sticker
Christ Clinic Patient Visit Process

Patient with appointment check-out (p. 6)

**Patient**

- From p. 3
- From p. 4
- Confirm appointment
- Change existing appointment?
  - Yes → Select the appointment
  - No → Change existing appointment?
    - Yes → Select the appointment
    - No → No further action required

**Front Desk**

- Collect super bill (physical drop box)
- Select patient from list of appointments
- Need follow-up appointment?
  - Yes → Go to "Schedule an appointment"
  - No → Enter appointment type, notes and save the appointment
- Change existing appointment?
  - Yes → Select the appointment
  - No → No further action required

- Click "Patient reschedule"
- Save the rescheduled appointment
- Cancel existing appointment?
  - Yes → Select appointment to be cancelled
  - No → No further action required

- Click on "Claim: Billing"
- Enter appropriate codes (established/new patient, lab, etc.)
- Enter the doctor’s name and department
- Click on "Create Claim"
- Enter method of payment as "Cash"
- Inform patient of total charges due
- Accept cash from patient

- Print receipt
- Appointment changes made?
  - Yes → Highlight appointment changes on receipt
  - No → No further action required
- Highlight appointment changes on receipt
- Hand receipt to patient
- Patient has questions about appt.?
  - Yes → Go to "View appointments"
  - No → Confirm appointment with patient

- Confirm appointment with patient
  - Inform patient of appointment

Dashed line process steps may or may not be executed in every iteration
Failure Mode & Effects Analysis (FMEA)

- Identifies:
  - Potential failures – What could go wrong?
  - Potential effect of failures
  - Potential cause(s) of failures

- Prioritizes potential failures
  - Sort by risk priority number (product of severity, occurrence & detection)
# Prioritizing Root Causes

<table>
<thead>
<tr>
<th>No.</th>
<th>Owner</th>
<th>Process Step</th>
<th>Potential Failure Mode</th>
<th>Potential Effect of Failure</th>
<th>S</th>
<th>Potential Cause</th>
<th>O</th>
<th>Current Control</th>
<th>D</th>
<th>RPN</th>
</tr>
</thead>
<tbody>
<tr>
<td>6</td>
<td>Front Desk</td>
<td>Select the appointment</td>
<td>Number of visits not maximized for each HP</td>
<td>Clinic not functioning at full capacity</td>
<td>7</td>
<td>Different HPs have different appointment durations</td>
<td>10</td>
<td>None</td>
<td>10</td>
<td>700</td>
</tr>
<tr>
<td>45</td>
<td>MA</td>
<td>Record patient vitals</td>
<td>Patient vitals are inaccurate</td>
<td>May negatively affect diagnosis</td>
<td>10</td>
<td>MA.s do not understand best practices for taking vitals</td>
<td>7</td>
<td>HPs retake abnormal vitals</td>
<td>8</td>
<td>560</td>
</tr>
<tr>
<td>166</td>
<td>Front Desk</td>
<td>Patient has questions about appt.</td>
<td>Patients ask front desk staff questions</td>
<td>Increases check-out time</td>
<td>7</td>
<td>Patients do not understand medical diagnosis/treatment instructions/explanations</td>
<td>10</td>
<td>Front desk can only answer some questions</td>
<td>8</td>
<td>560</td>
</tr>
<tr>
<td>134</td>
<td>MA</td>
<td>Note times when tubes need to be spun on label</td>
<td>Labs are not processed</td>
<td>Patient must revisit clinic for addt’l specimen collection</td>
<td>10</td>
<td>No standardized process for specimen collection &amp; processing</td>
<td>4</td>
<td>None</td>
<td>10</td>
<td>400</td>
</tr>
<tr>
<td>41</td>
<td>MA</td>
<td>Select patient appt. &amp; click &quot;Start Intake&quot;</td>
<td>Each MA does their work separately</td>
<td>Increases patient visit duration</td>
<td>6</td>
<td>MA’s sequence of activities not optimized for efficiency</td>
<td>6</td>
<td>None</td>
<td>10</td>
<td>360</td>
</tr>
<tr>
<td>115</td>
<td>MA</td>
<td>Draw blood for patient</td>
<td>Not enough blood is drawn</td>
<td>All ordered tests cannot be run</td>
<td>9</td>
<td>Human error (mistakenly draw small blood sample)</td>
<td>4</td>
<td>None</td>
<td>10</td>
<td>360</td>
</tr>
</tbody>
</table>

HP – Healthcare Provider; MA – Medical Assistant
S – Severity; O – Occurrence; D – Detection; RPN – Risk Priority Number = S x O x D
## Summary of Solutions

<table>
<thead>
<tr>
<th>Root Cause</th>
<th>Solution</th>
<th>Implementation</th>
</tr>
</thead>
<tbody>
<tr>
<td>#1 Different HPs have different appointment durations</td>
<td>Redefine visit duration template for select providers</td>
<td>Complete</td>
</tr>
</tbody>
</table>
| #2 MAs do not understand best practices for taking vitals                 | * Host a “lunch & learn” to develop standard practices for recording vitals  
* Purchase & hang clock in each exam room  
* Audit Medical Assistants taking vitals (annually each summer)              | Complete        |
| #3 Patients do not understand medical diagnosis/treatment instructions/  | Add the practice of “discharge teaching” to the patient visit process for Medical Assistants  | Complete        |
| explanations                                                               | to perform with each patient                                                                  |                 |
| #4 No standardized process for specimen collection & processing           | Change process where blood is drawn & processed after patient check-out by one MA             | Complete        |
| #5 MA’s sequence of activities not optimized for efficiency                | Develop routines to maximize MA’s time utilization                                             | Complete        |
| #6 Human error (mistakenly draw small blood sample)                       | Write “difficult” in red on the blood vials so they will be processed by experts in lab       | Complete        |

HP – Healthcare Provider  
MA – Medical Assistant
**Auditing MAs Taking Vitals**

- Conducted annually
- Utilizes checklist for auditing established best practices
- Resource for training new MAs/interns

### Christ Clinic Vitals Audit Form

<table>
<thead>
<tr>
<th>Vital</th>
<th>Best Practice</th>
<th>Circle Appropriate Response</th>
</tr>
</thead>
<tbody>
<tr>
<td>Body Temperature</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Did MA check the setting?</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>Oral – Did MA ask the patient to close their mouth?</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>Axillary – Did MA close and rest the patient’s hand?</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>Pulse Ox</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Did MA record the pulse Ox reading?</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>Did MA keep the device on the patient’s finger for the recommended time of 1 minute?</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>If pulse Ox is low, did the MA ask the patient to take a deep breath and retake the reading?</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>Blood Pressure</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Did MA place the cuff on the upper arm with the arrow pointing towards the elbow?</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>Did MA ask the patient to rest their arm?</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>Was the BP recorded as per best practices?</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>If BP is abnormal, did MA retake the BP?</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>When retaking the BP, did MA switch arms?</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>Pulse Rate</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Adult – Did MA feel the radial (wrist) artery?</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>Kids – Did MA feel the carotid (neck) artery?</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>Did MA feel the pulse using fingers?</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>Respiration Rate</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Was the MA discrete?</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>Menstrual Cycle</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Did MA ask for the first day of the last menstrual cycle?</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>Additional Best Practices</td>
<td></td>
<td></td>
</tr>
<tr>
<td>If there were abnormal vitals, did the MA inform the provider?</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>If MA could not take vitals, did they ask the Healthcare Provider to take them?</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>Did MA confirm the reason for visit?</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>Did MA confirm the patient’s current pharmacy with the address?</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>Did MA ask if the patient is allergic to any medication?</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>Did MA confirm patient’s current medication(s)?</td>
<td>Yes</td>
<td>No</td>
</tr>
</tbody>
</table>
Christ Clinic Patient Visit Process

**Patient with appointment check-in (p. 1)**

1. Fill in "Patient Information" form
2. Fill in "Annual Update Patient Information" form
3. Return forms to Font Desk staff

---

**Athena – Electronic Health Records System; Dashed line indicates a break in the process.**

*Tax returns, 3 current pay stubs, letter from employer or bank statements; **From the patient’s profile on a sticker*
Christ Clinic Patient Visit Process

**Patient visit – Blood draw and labs (p. 7)**

- **Medical Assistant**
  - From p. 4
  - Mobile lab van present?*
    - No
  - Can direct patient to mobile lab?*
    - No
  - Inform patient of mobile lab van
  - Patient wants to use mobile lab?*
    - No
  - Give patient “Mobile Van Blood Work Slip” & list of required tests
  - Patient needs more tests?*
    - Yes
    - Go to p. 6
    - No action required

- Inform patient lab charges
- Draw blood for patient
- Attach patient tags to tubes & keep them in lab area
- Escort patient to check out area
- Put super bill in physical drop box
- Go to p. 6

- Select patient appointment
- Go to “Quickview” & scroll to appointment & click on today’s appointment
- Go to “Patient” tab & scroll to “Labs”
- Select lab order entry
- Select lab order entry
- Lab closed out?
  - Yes
  - Click “Return to submit”
  - Select “Billing Type” as “Practice”
- No

- Select “Specimen Source” as “Blood Venous”
- Enter “Collection date and time”, select “Order submitted” as “By print paper out”
- Print label(s) (for tubes)
- All labs for patient done?
  - Yes
  - Go to “Quickview” & print requisition
  - Have tubes been spun?**
    - No
    - Note time when tubes need to be spun on label
  - Yes
  - Place bag in “Completed Labs” drawer
- No

- Attach label(s) on tube(s)***
- Put requisition in bag
- Put tubes in bag (after spinning)
- Enough blood specimen for all test?
  - Yes
  - Write “Difficult” on the vial
  - Place bag in “Completed Labs” drawer
  - No
  - No
  - Enough blood specimen for all test?
    - No
    - Write “Difficult” on the vial
    - Place bag in “Completed Labs” drawer
    - Yes
    - Enough blood specimen for all test?
      - Yes
      - Write “Difficult” on the vial
      - Place bag in “Completed Labs” drawer
      - No
      - Enough blood specimen for all test?
        - No
        - Write “Difficult” on the vial
        - Place bag in “Completed Labs” drawer
        - Yes
        - Enough blood specimen for all test?
          - Yes
          - Write “Difficult” on the vial
          - Place bag in “Completed Labs” drawer
          - No
          - Enough blood specimen for all test?
            - Yes
            - Write “Difficult” on the vial
            - Place bag in “Completed Labs” drawer
            - No
            - Enough blood specimen for all test?
              - Yes
              - Write “Difficult” on the vial
              - Place bag in “Completed Labs” drawer
              - No
              - Enough blood specimen for all test?
                - Yes
                - Write “Difficult” on the vial
                - Place bag in “Completed Labs” drawer
                - No

---

Dashed line represents a pause in process; *Performs A1C, lipids, PSA (males) & BP tests for free (monthly); **Tubes are spun 30 minutes blood draw; ***Separate bags for Quest Diagnostics & Houston Methodist Hospital
Patient Feedback Form

- Provides data to compute level of patient satisfaction
- Useful for developing ideas for future improvement projects
Letter Template

Letter of Financial Dependence

Enter today’s date

Enter patient’s name here

Enter patient’s address here

To Christ Clinic,

I, enter patient caretaker’s name here, am currently supporting enter patient’s name here with their monthly bills and expenses. He/she is responsible for his/her medical expenses.

Patient’s caretaker signs here

Enter today’s date

• Clinic requires unemployed patients to produce a letter of financial dependence

• Written & signed by the person supporting the patient
Initial Results

**Before:**
- Average/mean: 74.8 min.
- Standard deviation: 36.8 min.
- Sample size: 5,435 patient visits
- Time period: 7 months (7/2016-1/2017)

**After:**
- Average/mean: 57.7 min.
- Standard deviation: 29.0 min.
- Sample size: 2,351 patient visits
- Time period: 3 months (2/2017-4/2017)
Next Steps

• Determine the degree of improvement achieved
  – Collect measurements of improved process performance through Jun. 2017
  – Complete comparison with baseline measurement

• Document lessons learned

• Close the project
Industry-Academia Partnerships

- Sponsored projects are value added
  - Organizations:
    - Low cost assistance to solve pressing problems
    - Build relationships with future graduates/employees
  - Students:
    - Meaningful learning experiences

www.uh.edu/cot/lscert
Thank you for your attention!

Questions?

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