A PATIENT CENTRIC CARE PARADIGM - ROLE OF BIG DATA

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CenturyLink a “Global Healthcare IT Provider”

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Provider agnostic Cloud Consulting & Pro Services
Application Services
Data & Analytics
Security
Hybrid IT & Cloud Management
Enterprise Application Platform Professional Services
Integrated Solutions

World Class IP, Telephony Network & Data Centers

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Big Data & Business Analytics Symposium - March 23-24, 2017
The Patient Centric Model

Adoption of the “Difficult” Patient

Medical Model

- Patient’s role is passive
  (Patient listens more)
- Patient is the recipient of treatment
  (Physician provides opinion, does not offer options)
- Physician dominates the care conversation
  (Physician prescribes)
- Care is disease-centered
  (Disease is the focus of daily activities)
- Care decisions are based on available data
  (Current episode and available background data is the focus of care decisions)
- Physician does most of the talking

Patient-Centric Model

- Patient’s role is active
  (Patient comes in armed with information (false or true) and asks questions and expects them to be answered)
- Patient is partner in the treatment plan
  (Patient researches and asks about options, Physician educates and discuss)
- Physician collaborates with the patient
  (Physician Seeks and offers opinion, provides options, discusses pros and cons)
- Care is quality-of-life centered
  (Patient focuses on personal preferences, needs, family and personal values)
- Care driven by 360 degree understanding of the patients needs
  (Physician has all data for the patient across all encounters with complete history and background)

- ✓ Patient is may or may not adhere to treatment plan
  (Treatment accommodates patient’s cultures & values)
- ✓ Care is restricted by the data available and may costs more
- ✓ Patient is more likely to adhere to treatment plan
  (Treatment accommodates patient’s cultures & values)
- ✓ Care is comprehensive and cost efficient
The Patient Centric Healthcare Paradigm

Data at the Heart of Care - Improved Outcomes

It’s not what I can do for my patient but what we can do together

Collaborative Engagement through
INFORMED DISCUSSION

Patient is more likely to adhere to treatment plan
(Treatment accommodates patient’s values)

Quality of care guided by
INDIVIDUALIZED CHOICES

Patient-Centric Care Model

Data

Education

Monitoring

Prevention

Treatment

The New Paradigm
The Data Explosion

90% of data in the world today has been created in the last two years *

- IBM estimates that 2.5 quintillion bytes (2,500,000 Terabytes or 2.5 Exabyte) of data is generated daily which translates to 912.5 Exabyte or ~ 1 Zettabyte in a single year in 2016 *

- Forbes / IDC projection for 2025 **:
  - 152,000 Smart Devices will come on line Every Minute
  - 80 billion devices will be connected to the Internet

Total data in the world according to Forbes quoting Vernon Turner, senior vice president of enterprise systems at IDC **:

Gartner & Forbes / IDC projections for connected devices ***:

* IBM
** Forbes / IDC
*** Gartner
Value from data needs to be democratized to be effective
Postoperative recurrence of malignancy reductions for identified individuals.

Data aggregated from diverse sources

Define and organize a data model that is based on a 360 degree view of each patient in the target population.

Use statistical techniques to develop a predictive scoring algorithm that ranks the patients in order of statistical probability and correlates and validates all findings with actual occurrence within the target population.

- Provide result, get meaningful input and use the input to improve the model.
- Continuous evaluation of the model performance with new data.

Case Study: Location-based Analytics

Using Data to Improve the Quality of Care

**Typical office-visit workflow** *

1. **Patient arrives**
2. **Patient completes paper work**
   - Chief Complaint
   - Demographics Information
   - Past Medical Information
   - Current Medications
   - Insurance
3. **Patient waits in the reception area until called in**
4. **Patient moves to the examination room**
5. **Nurse / MA makes initial evaluation, takes vitals, confirms chief medical complaint, verifies medications**
6. **Physician sees patient, reviews patient charts, performs examination, creates diagnosis (DD), creates provider note, orders labs**
7. **Physician creates a final diagnosis based on reviewed information and patient examination, updates patient chart, orders Rx, creates referrals, educates patient**

**Location-based Analytics**

- **Patient is provided a simplified version of form to collect pre-arrival information via web at the time of scheduling an app based appointment**
- **Patient's registered device is sensed and identified by Provider Wi-Fi**
- **Patient record is identified and aggregated information pulled from the EMR**
- **Patient arrival and provider relevant information is displayed on provider / assistants device**
- **When provider is ready patient is informed via device / announcement**
- **Patient information is available via provider's device**
- **Aggregated pertinent Patient information is displayed in real time and is also updated via provider's device**

**Information pertinent for reception needs is displayed on the reception screen and patient asked to log in, update / confirm as needed (including chief complaint, medications, etc..)**

**Pre visit education and pertinent advertisement delivered to the patient mobile device**

**When provider is ready patient is informed via device / announcement**

**Patient information is available via provider's device**

**Aggregated pertinent Patient information is displayed in real time and is also updated via providers device**

**Location-based Analytics**

- **Improve patient engagement and satisfaction,**
- **Improve appointment scheduling,**
- **Reduce no-shows,**
- **Reduce paper work and support staffing needs,**
- **Reduce wait times,**
- **Track changes in patient pre arrival information faster and more accurately,**
- **Track / monitor and understand the patient’s visit dynamics like the average time patients spend in each stage of their visit and use to metrics to improve delivery of care**
- **Reduce the over all time of engagement**
- **Understand and improve the time a provider needs to spend on the screen vs that with the patient**
- **Receive updated information in real time and populate**
- **Identify inefficiencies and build efficiencies within systems and processes,**
- **Utilize collected data for insights to enhance care outcomes while reducing risk and cost**
- **Add Predictive modeling on collected data for enhancing and optimizing process and solutions**

* Adapted from National Center for Biotechnology Information (NCBI)
### De-centralized Data Sources and Manual Processes

<table>
<thead>
<tr>
<th><strong>Preparation</strong></th>
<th>Manual, Paper based Cumbersome, Fragmented and Time and resource intensive</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Communication</strong></td>
<td>Fragmented and lacking traceability and follow-up</td>
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<tr>
<td>Sub Teams work in silos chasing different systems/information via different methods impacting collaboration.</td>
<td></td>
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<tr>
<td><strong>Audit and Follow-up</strong></td>
<td>Multiple reports for status updates pulled individually from EMR</td>
</tr>
<tr>
<td>Audit for measures, assignments and work done the previous day is cumbersome and</td>
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<tr>
<td><strong>Workflow</strong></td>
<td>Existing huddling system doesn't integrate with clinical workflow/decision support and provide performance tracking</td>
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<tr>
<td>Huddling process and approach are not in alignment with patient care / flow</td>
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### Centralization of Data and Automation of Delivery

<table>
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<tr>
<th><strong>Preparation</strong></th>
<th>Centralized communication with universal messaging (sms, cell, text, fax, tasking, etc.) allows for uniformity of management &amp; awareness across sub teams</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Communication</strong></td>
<td>Process can be automated and time and resources saved by delivering the information as intuitive dashboards and updateable reports</td>
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<tr>
<td>Consistent communications are guaranteed by use of shared reports and dashboards</td>
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<tr>
<td>Centralization of data across EMRs and non medical data sources (which can also incorporate social data in certain circumstances) allows for delivery of data to the teams uniformly and consistently without the need to go look for information</td>
<td></td>
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<tr>
<td><strong>Audit and Follow-up</strong></td>
<td>Auditing and reporting of follow-up items is simplified</td>
</tr>
<tr>
<td>Hands on drillable dashboards and reports provide audits across the needs extending from compliance to disease protocol adherence to completion of orders and assignments from the previous day</td>
<td></td>
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<tr>
<td><strong>Workflow</strong></td>
<td>Centralization of Data on a unified Big Data platform allows for consistency of delivery within the existing workflows for the providers resulting in less disruption and changes in workflows and efficiencies therein.</td>
</tr>
<tr>
<td>Huddles are focused and deliver consistent information promoting provider satisfaction and patient engagement while reducing risk and cost</td>
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### Use Data Analytics

- Predictive support for disease management and decisions
- Population Health Management Solutions
- Real time point of care opportunity identification and intervention (e.g. Social services needs for child care or frequent flyers)
- Inpatient Readmission Analysis and Preventative Intervention
- Mortality, morbidity and in-patient risk reduction (e.g. Sepsis, Stroke, Hospital acquired infections and other conditions)
- Average Length of Stay (ALOS) and Average Cost of Stay ACOS analysis, prediction and reduction
- Provider and ACO capitation, performance, compliance

- Disease Protocol Adherence / Reporting for quality measurement like HEDIS, STAR, PQRS, NQF and others
- Underpayment Recovery
- Fraud and abuse
- Device Data / Healthcare IoT solutions
- Increase intra and inter system efficiency in delivery of care
- Screening (candidates / employees / patients)
- Insurance risk assessment and decisions
- Performance based compensation for providers and supporting staff
- Staffing strategies and planning
- …..

### Additional Case Studies and Use Cases

Reduce Risk and Cost, Increase Patient Engagement and Improve Outcomes

- Reduce risk
- Increase Patient Engagement
- Improve outcomes
How CenturyLink Solves the Big Data Needs
The End-To-End Healthcare Technology Components

BDaaS

The Right Partnership

CenturyLink Big Data Platform as a Service

Hadoop
Queries
Streams

Command and Control

Deployment Center
Operations Center
Support Center
Application Center
Knowledge Center

Cloud Resolution for Hadoop
Hortonworks Data Platform
Elasticsearch/ Solr
Hbase/ Accumulo/ MongoDB
Impala/ Stinger

Storm

Enterprise Grade Security

Perimeter Security
Access Control
Encryption
Audit Logging
Backups
Disaster Recovery
Compliance Support

Flexible Deployment Options

Public Cloud
Virtual Private Cloud
Enterprise Private Cloud
Dedicated Cluster

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Of the top 40 organizations patenting the most algorithms in the past five years, **33 are Chinese businesses** and universities. The only western company in the top 10 is IBM at No. 10 *

* Gartner
Towards the patient centric healthcare paradigm

Question and Answers
Thanks