Session Objectives

To describe how our organization reduced sepsis mortality, saved lives and saved millions of dollars by:

- Establishing a regional/system collaborative infrastructure
- Understanding and managing the drivers of variation in care delivery
- Leveraging the role of the Sepsis RN in early identification, treatment, and standardization of sepsis care
Disclosure

Aceso Cloud-SJHH has entered into a service agreement for use of the software application.

Snapshot of St. Joseph Health

<table>
<thead>
<tr>
<th>FY15 Statistics</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Full-Time Employees</td>
<td>23,770</td>
</tr>
<tr>
<td>Total Revenues</td>
<td>$6.2B</td>
</tr>
<tr>
<td>Community Benefit (total quantifiable community benefits excluding Medicare)</td>
<td>$441.4M</td>
</tr>
<tr>
<td>Patient Discharges</td>
<td>155,699</td>
</tr>
<tr>
<td># of members for whom SJH is at risk</td>
<td>272,468</td>
</tr>
<tr>
<td>% of members for whom SJH is at risk</td>
<td>34%</td>
</tr>
<tr>
<td>Medical Group Visits</td>
<td>2,252,354</td>
</tr>
<tr>
<td>Outpatient Visits</td>
<td>5,034,938</td>
</tr>
<tr>
<td>ED Visits (Non-Admitted Patients)</td>
<td>539,059</td>
</tr>
<tr>
<td>Home Health Visits</td>
<td>243,702</td>
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</table>
The “Why” – Business Case for Improving Sepsis

- Sepsis is the leading cause of mortality at St. Joseph Health ("SJH") and nationally.
- At SJHH, sepsis accounts for approximately 10,000 cases annually at more than $150M spent in care delivery.
- Sepsis mortality was chosen as a key strategic goal for the organization with direct impact to leadership incentives.
- Sepsis is a key driver of population health.
- Sepsis exposes all that is “weak” with your current system of care.

Context: Local / Regional / System

- Hoag: Improved Mortality with Sepsis nurse, Triage pt to appropriate level of care, P<0.05, Sepsis floor, Sepsis App, SNF collaboration
- SoCal: How to scale across 5 hospitals - Earn trust/relations, - data harmonization/comparison, - meeting structure and pacing, - Clinical operations, - Educational Content creations/distribution, - Interaction w/all ministry leaders
- System: How to scale across 3 regions - acceleration and adoption, - system and geographic variation, - Clinical capability and variation impact
### Sepsis Challenges & Opportunities

Sepsis care will expose all that is weak with our current system of care …

- Communication/Coordination of care between providers
- Location of care
- Documentation/Coding/Billing
- Readmissions
- Pre- and post-hospitalization care
- IT systems
- Data collection systems
- Speed and ability of system to change
- Ability for standardization of care across region
- Stamina to continue – keep/maintain gains
- Ability to educate workforce and keep updated
- Horizontal vs vertical integration
- Changing current culture

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### Chasing Sepsis at Hoag

<table>
<thead>
<tr>
<th>Year</th>
<th>Initiative</th>
<th>Results</th>
</tr>
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<tbody>
<tr>
<td>2004</td>
<td>Critical Care Unit</td>
<td>↓ Mortality 40% to 28%</td>
</tr>
<tr>
<td></td>
<td>Focus = septic shock (DRG 870)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>ICU staff</td>
<td></td>
</tr>
<tr>
<td></td>
<td><strong>SubICU/Tele/ Med-Surg</strong></td>
<td></td>
</tr>
<tr>
<td>2009</td>
<td>Triage, 3 Protocols</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Hospitalists/ OR/RRT/ Sepsis Nurse</td>
<td></td>
</tr>
<tr>
<td></td>
<td><strong>↓ Mortality 28% to 14% (p&lt;0.05)</strong></td>
<td></td>
</tr>
<tr>
<td></td>
<td><strong>↓ Cost to $31K</strong></td>
<td></td>
</tr>
<tr>
<td>2012-2013</td>
<td>Emergency Department</td>
<td></td>
</tr>
<tr>
<td></td>
<td>ED Staff/ Nurses</td>
<td></td>
</tr>
<tr>
<td></td>
<td>ED Protocol &amp; Order Sets</td>
<td></td>
</tr>
<tr>
<td></td>
<td><strong>↓ Mortality to 11.5%</strong></td>
<td></td>
</tr>
<tr>
<td></td>
<td><strong>↓ Cost to $15K</strong></td>
<td></td>
</tr>
<tr>
<td>2014-2015</td>
<td>Care path/Pt. movement</td>
<td></td>
</tr>
<tr>
<td></td>
<td>SNF Readmission</td>
<td></td>
</tr>
<tr>
<td></td>
<td>End of life/Long-term vent</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Advanced analytics</td>
<td></td>
</tr>
<tr>
<td></td>
<td><strong>↓ Mortality to 10%</strong></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Cost $9.5K</td>
<td></td>
</tr>
<tr>
<td>2016</td>
<td>Sepsis floor</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Mass Customization</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Sepsis App</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Patient experience</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Readmission work</td>
<td></td>
</tr>
<tr>
<td></td>
<td><strong>$11M in savings</strong> (Baseline 2013)</td>
<td></td>
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</table>
### Critical Care Sub-ICU Med/Surg Total

<table>
<thead>
<tr>
<th>Year</th>
<th>Patient Count</th>
<th>Age</th>
<th>LOS</th>
<th>APACHE</th>
<th>Mortality</th>
<th>Patient Count</th>
<th>Age</th>
<th>LOS</th>
<th>APACHE</th>
<th>Mortality</th>
<th>Patient Count</th>
<th>Age</th>
<th>LOS</th>
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<th>Age</th>
<th>LOS</th>
<th>APACHE</th>
<th>Mortality</th>
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<tbody>
<tr>
<td>2009</td>
<td>200</td>
<td>65.0</td>
<td>10.5</td>
<td>18.6</td>
<td>18.5%</td>
<td>111</td>
<td>68.8</td>
<td>8.0</td>
<td>14.3</td>
<td>5.4%</td>
<td>74</td>
<td>64.4</td>
<td>5.6</td>
<td>12.8</td>
<td>5.4%</td>
<td>385</td>
<td>66.0</td>
<td>8.8</td>
<td>16.3</td>
<td>10.6%</td>
</tr>
<tr>
<td>2010</td>
<td>168</td>
<td>68.1</td>
<td>10.6</td>
<td>20.8</td>
<td>15.4%</td>
<td>115</td>
<td>67.8</td>
<td>6.7</td>
<td>14.7</td>
<td>4.3%</td>
<td>53</td>
<td>67.2</td>
<td>5.3</td>
<td>12.1</td>
<td>0.0%</td>
<td>336</td>
<td>67.6</td>
<td>8.4</td>
<td>17.3</td>
<td>9.2%</td>
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<tr>
<td>2011</td>
<td>347</td>
<td>66.2</td>
<td>9.6</td>
<td>21.6</td>
<td>12.7%</td>
<td>311</td>
<td>67.2</td>
<td>7.2</td>
<td>14.3</td>
<td>2.6%</td>
<td>129</td>
<td>64.5</td>
<td>6.6</td>
<td>12.0</td>
<td>2.3%</td>
<td>787</td>
<td>66.4</td>
<td>8.1</td>
<td>17.1</td>
<td>6.9%</td>
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### Bundle Element Compliance

<table>
<thead>
<tr>
<th>Year</th>
<th>Patient Count</th>
<th>Fluid</th>
<th>Abx</th>
<th>MAP</th>
<th>Glycemic</th>
<th>Patient Count</th>
<th>Fluid</th>
<th>Abx</th>
<th>MAP</th>
<th>Glycemic</th>
<th>Patient Count</th>
<th>Fluid</th>
<th>Abx</th>
<th>MAP</th>
<th>Glycemic</th>
<th>Patient Count</th>
<th>Fluid</th>
<th>Abx</th>
<th>MAP</th>
<th>Glycemic</th>
</tr>
</thead>
<tbody>
<tr>
<td>2009</td>
<td>200</td>
<td>53%</td>
<td>97%</td>
<td>79%</td>
<td>89%</td>
<td>111</td>
<td>47%</td>
<td>98%</td>
<td>88%</td>
<td></td>
<td>74</td>
<td>41%</td>
<td>100%</td>
<td>71%</td>
<td></td>
<td>385</td>
<td>51%</td>
<td>97%</td>
<td>79%</td>
<td>89%</td>
</tr>
<tr>
<td>2010</td>
<td>168</td>
<td>73%</td>
<td>100%</td>
<td>77%</td>
<td>89%</td>
<td>115</td>
<td>57%</td>
<td>97%</td>
<td>64%</td>
<td></td>
<td>53</td>
<td>80%</td>
<td>96%</td>
<td>90%</td>
<td></td>
<td>336</td>
<td>69%</td>
<td>98%</td>
<td>73%</td>
<td>89%</td>
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<tr>
<td>2011</td>
<td>347</td>
<td>74%</td>
<td>98%</td>
<td>86%</td>
<td>88%</td>
<td>311</td>
<td>66%</td>
<td>97%</td>
<td>79%</td>
<td></td>
<td>129</td>
<td>58%</td>
<td>91%</td>
<td>74%</td>
<td></td>
<td>787</td>
<td>72%</td>
<td>98%</td>
<td>83%</td>
<td>88%</td>
</tr>
</tbody>
</table>

### Hoag Sepsis App
Daily Occupancy / Heat Map

Cost Variation – Level of Care LOS
Our Call to Action

- All ministries achieve a 10% or less raw mortality rate
- All ministries able to reduce their cost per case and achieve positive Medicare contribution margin
- Iterate quickly and not be encumbered by our size
- Leverage our size to drive change at a national level
- Develop a collaborative model that is reproducible and scalable

“Intentional Care Design”

Our Mantras...

- Quality Drives Cost
- Think regionally, act locally
- Collaborate to compete externally, not internally
- Fail fast, fail cheap
Collaborative Infrastructure

Data Analytics
- Definitions, Reports, Data Sources, Gap Analysis on Opportunities

Sepsis Workflow/ Best Practice
- Inventory of current state at each Ministry; Gap Analysis to Best Practice (from Recognition to Discharge); Resource Identification/Gaps (RRT, Code Sepsis, Dedicated Coordinator)

Order Set Standardization / Adoption
- Review Current order sets and barriers to compliance.
- Develop strategies for consensus building and vetting to achieve physician adoption.

Documentation and Coding
- Select a sample of charts per DRG per ministry and utilize common tool to review systematically.
- Identify documentation gaps and coding opportunities.

Financial Analysis
- Utilize analytic tools (e.g. Tableau or Inovaare) to identify variation and drive utilization opportunities.

Sepsis Collaborative: A Phased Approach

Phase 1
- Infrastructure
- Data Analytics
- 3/6 hr Bundles
  - Set up infrastructure for data collection/analytics
  - Identify opportunities related to documentation and coding
  - Develop understanding of outcomes/cost/utilization
  - Develop plan to improve outcomes with increased compliance of 3/6 hour bundles
  - Creation of 3/6 hour regional order set
  - Re-design care for 3/6 hour bundle delivery in ED/hospital floor

Phase 2
- Level of Care/Patient Flow Care Pathways (post 6 hrs)
  - Triage of floor
  - Level of Care Criteria
  - Patient movement thru hospital

Phase 3
- Discharge Post-Acute
  - Discharge process
  - End of Life approach
  - Working w/ SNF & LTAC
  - Readmissions
  - Post-Sepsis Syndrome
**Defined Roles: Think Regionally, Act Locally**

**Regional Sepsis Team & System Resources**
- Liaison to Regional and System SMT
- Data Gathering/Analysis
- Operational/Financial Data Analysis
- Coordination of Resources/IT
- Coding/Review
- Order Set Management
- PI/Project Management
- Patient Tracking/Reporting
- Educational Content Creation

**Local Sepsis Team & Ministry Resources**
- Tailor/Implement Local Care Process
- Delivery of Care
- Feedback on Process/Resource
- Feedback on Outcomes/Cost
- Coordination of Care Daily
- Maintain Up-to-date Clinical Guidelines
- Local Sepsis Team
- Educational Content Distribution

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**Collaborate Internally, Compete Externally**

- Brought together physicians (ED, Hospitalists, and Intensivists), nurses, quality leaders and administration from each ministry.
  - No opt out!
  - All-day sessions, held at an off-site location
  - Purposely assigned seats to co-mingle ministries
  - Face-to-Face to build trust and collaboration
  - Structure: interactive with concrete deliverables
  - Virtual meetings for parallel projects
Workflow Analysis: Early Recognition

**Workflow Diagram:**
- Admission, Level of Care, Bed Request
- Decision to Administer Sepsis Medication
- Lab Drawn
- Patient Triage
- ABX Started
- Patient Moved to Unit
- Patient Seen by MD
- CRN/Pivot used in different ways
- Electronic screening tool used
- Time of Recognition (time stamp of first sepsis order set)
- **T₀ + 3 Hours** Lactate Drawn, ABX Given, 30 cc/kg given
- **T₀ + 6 Hours** Repeat Lactate, Vasopressors, Reassessment
- **T₀** time when all 3 criteria are met:
  - Documentation of suspected infection
  - 2 SIRS criteria
  - 1 end-organ dysfunction

**Septic Shock Diagram:**
- **T₀** Persistent Hypotension
- **T₀ + 3 Hours** Lactate Drawn, ABX Given
- **T₀ + 6 Hours** Repeat Lactate, Vasopressors, Reassessment
- **Septic Shock T₀** = lactate result time
- If initial lactate ≥ 4.0, CMS Septic Shock T₀ = lactate result time

---

**Clinical Notes:**
- **T₀** = Time of Recognition (time stamp of first sepsis order set)
- **T₀ + 3 Hours** Lactate Drawn, ABX Given, 30 cc/kg given
- **T₀ + 6 Hours** Repeat Lactate, Vasopressors, Reassessment

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In the septic patient, if the initial lactate ≥ 4.0, CMS Septic Shock T₀ = lactate result time
Sepsis Nurse Role

- Ensure 3- and 6-hour bundle compliance
  - Directly related to mortality

- Follow up on sepsis pt x 24hrs to readjust level of care as need
  - Optimize level of care to optimize cost
    - Level of care is >60% of all sepsis cost

Bundle Compliance Affects Mortality

- Overall
- Fluid not met
- Mean BP not met
- Antbx not met

Graph showing data points for years 2014, 2015, and 2016.
### Sepsis Survivor vs. Non-Survivor Cost

<table>
<thead>
<tr>
<th></th>
<th>Survivor</th>
<th>Non Survivor</th>
</tr>
</thead>
<tbody>
<tr>
<td>All</td>
<td>$10,473</td>
<td>$16,615</td>
</tr>
<tr>
<td>Hospital A</td>
<td>$8,921</td>
<td>$21,081</td>
</tr>
<tr>
<td>Hospital B</td>
<td>$10,413</td>
<td>$15,049</td>
</tr>
<tr>
<td>Hospital C</td>
<td>$11,731</td>
<td>$17,334</td>
</tr>
<tr>
<td>Hospital D</td>
<td>$11,149</td>
<td>$13,596</td>
</tr>
</tbody>
</table>

### Business Case for Sepsis Nurse

- Outcomes in Sepsis is dependent on recognition and compliance on 6 hour bundle.
- Cost in Sepsis is mainly due to Room & Board (i.e. nursing ratio and level of care).
- The number of cases is rising.
- If we can improve on outcomes and pt movement thru hospital we can save $1,000 per case.
- 24/7 Sepsis nurse coverage would lead to a 3-4x ROI on cost and pt lives saved.
Patient / Family Education

- General patient / family educational brochure
- Steps to a Successful Discharge
- Post-Sepsis Syndrome

Goals of Care
- Within 36 hours of admission:
  - Family spokesperson identified
  - Introduced to attending physician
  - Orientation to unit/hospital routine and resources
  - Patient Advance Directive information and/or goals of treatment
- Within 3-4 days:
  - Meet with social services, CARES team, and pastoral care (as desired)
- Throughout the hospitalization:
  - To promote patient and family- centered outcomes and to assist in decision-making
  - Family is encouraged to contact the healthcare team through the identified family spokesperson
  - A care conference with the family, the attending physician, the nurse, social worker, and other disciplines may be needed

Expectations of Patients and Families:
It is expected that patients and families will be involved in care decisions.

Sepsis Resources
For general information about sepsis, visit:
- Sepsis Alliance: www.sepsisalliance.org
- WebMD: www.webmd.com
Bilateral Accountability: System Leadership

- Act as liaison to senior leaders
- Build business case for support and resources
- Held accountable for the resource utilization to meet objectives and performance outcomes

Scaling Obstacles

- IT platform
- Transforming culture- MD, nursing and admin collaboration
- Understanding readiness
- Not prescriptive
- Central and local accountability
- Trust- delivery, listening to frontline
Phase I Accomplishments

- Standard Order Sets for Sepsis (ED and Inpatient) 37 to 2
- Common Data Report; standards and definitions for measuring success
- Common tool for screening and documenting sepsis
- Approval from So Cal and NorCal CEOs for Sepsis RN function
- 270+ lives saved, $8.4M saved in cost/case

Providence St. Joseph Health

- Integrate sepsis collaborative into the new organization PSJH
- Develop structure, scale and spread across PSJH
- Sustainment
Success Drivers

Leadership
- Admin champion
- Physician champions
- Nursing champion
- Quality leaders
- Board Mandate/C-Suite Support

Infrastructure
- PI dedication
- Multidisciplinary team: nursing, resp, pharm, IT, EVS, bed board, HR, finance, case management, palliative
- 24/7 intensivists/ hospitalists/ED working together
- Sepsis nurse and coordinator
- IT support/ Inovaare platform for advanced analytics and apps

Communication
- Able to capture data and prove mortality and financials
- Understanding drivers for outcomes, resource utilization, cost, reimbursement
- Ability to capture and communicate clinical operations

Ah Hahs!
- Compliance drives mortality
- Hospital level of care drives cost
- Controllable variation is mainly in hospital operations
- Sepsis is not a critical care problem
- Ensure that quality is driving cost, not the other way around

PSJH Sepsis Leadership

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