

# Words Matter: Improving Inpatient Documentation of High-Risk Diagnoses

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## Disclosure of Financial Relationships

- None



## Background

- Importance of documentation
  - Conveys a patient's condition to other providers
  - Determines reimbursement
  - Facilitates clinical research using EMR data
  - Impacts quality/safety metrics



## Background

- Mortality Index

Observed Mortality

Expected Mortality



## Background

### •APR-DRG

- Each hospitalization is assigned an **all patient refined diagnosis-related group** (APR-DRG)
  - Predicts hospital resource utilization
- Sub-classified based on several factors, including **ICD diagnoses** that increase a patient's risk of mortality
  - Complications and comorbidities (CC)
  - Major complications and comorbidities (MCC)



## Background

### •Diagnoses

- Fever, unspecified
- High risk diagnoses (CC)
  - SIRS or Bacteremia
- Highest risk diagnoses (MCC)
  - Sepsis

Expected Mortality



## Background

- **Coders** extract diagnoses from notes
  - Aren't medically trained
  - Can't look at other parts of chart or make clinical inferences
- **Residents** are responsible for most of the documentation
  - Aren't trained in the importance of documentation
- **Example**
  - 5yo male with ESRD s/p failed DDRT, now HD dependent, presents with fever...



## Background

The screenshot shows the Epic EMR interface for a patient named DEEPA DILIP PATEL KULKARNI. The 'Notes' section is active, displaying a note with the following content:

**Subjective / Interval Events:**  
No acute events overnight. Patient had intermittent desats overnight to mid 80s while sleeping, which resolved with awakening, positional changes, and 0.5 L NC. No respiratory distress or wheezes appreciated by night team. Febrile to Tm 39.4 yesterday afternoon, afebrile since. BCx from 2/26 growing Staph aureus.

Review of Systems: 14-point review of systems performed, with pertinent interval changes documented above.

**Objective:**  
**Vital Signs** (last 24 hours):  
Temp: [36.2 °C (97.2 °F) 39.4 °C (102.9 °F) 36.4 °C (97.5 °F)]  
Heart Rate: [111-156] 130  
Resp: [20-22] 20  
BP: (95-123)/(46-66) 118/60 mmHg  
NBP Mean: [74-121] 74  
SpO2: [84 %-100 %] 99 %  
**Blood culture**, (2/26, central line): Staph aureus

**Assessment:**  
This is a 5 y.o. male with h/p ESRD 2/2 PUV and MCKD, s/p DDRT 11/28/10, s/p acute thrombosis of transplanted kidney necessitating immediate graft nephrectomy, now HD-dependent 4x/week with h/o seizure disorder, hypercoagulability, asthma, and multiple infections presenting with fever and URI symptoms, now found to have Staph aureus bacteremia. Continuing to treat with IV antibiotics.

**Plan:**  
ID: Febrile in setting of central line with blood cultures (2/26) growing Staph aureus. Also with h/o URI symptoms. Flu negative. On vancomycin and ceftriaxone. Blood cultures (2/27) from central line and peripheral negative to date.  
-S/p vancomycin x1 2/26 at DaVita. Will recheck vancomycin level today with dialysis. Goal levels 10-15. If level <15, will redose today.  
-Blood culture (peripheral and central line) today  
-F/u blood cultures (2/28)



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# Background

Code	Name	Comments				
780.60	Fever, unspecified					
Final Diagnoses (ICD-9-CM)						
Principal	Code	Name	POA	CC	HAC	Affects DRG
[P]	999.32	Bloodstream infection due to central venous catheter	Yes	CC		Yes
	585.6	End stage renal disease	Yes	CC		Yes
	996.81	Complications of transplanted kidney	Yes	CC		No
	790.7	Bacteremia	Yes	CC		No
	269.81	Primary hypercoagulable state	Yes	CC		No
	753.15	Congenital renal dysplasia		CC		No
	536.49	Other gastrostomy complication	Yes			
	V45.11	Renal dialysis status				
	345.90	Unspecified epilepsy without mention of intractable epilepsy	Yes			
	493.90	Unspecified asthma	Yes			
	465.9	Acute upper respiratory infections of unspecified site	Yes			
	276.7	Hyperpotassemia	Yes			
	783.40	Lack of normal physiological development, unspecified	Yes			
	041.11	Methicillin susceptible Staphylococcus aureus in conditions classified elsewhere and of unspecified site	Yes			
	733.90	Disorder of bone and cartilage, unspecified	Yes			



# Background

Admission Diagnoses / Reasons for Visit (ICD-9-CM)							
	Code	Name					Comments
Admission	780.60	Fever, unspecified					
Transfer							
Discharge							
Consult							
Procedure							
Charge Capture							
Periop							
FYI							
View-only Doc FL...							
Growth Chart							
Patient Station							
<b>Final Diagnoses (ICD-9-CM)</b>							
Principal	Code	Name	POA		HAC		Affects DRG
[P]	999.32	Bloodstream infection due to central venous catheter	Yes				Yes
	585.6	End stage renal disease	Yes	MCC			Yes
	996.81	Complications of transplanted kidney	Yes	MCC			Yes
	790.7	Bacteremia	Yes	CC			No
	289.81	Primary hypercoagulable state	Yes	CC			No
	753.15	Congenital renal dysplasia	Exempt from POA reporting	CC			No
	536.49	Other gastrostomy complication	Yes				
	V45.11	Renal dialysis status	Exempt from POA reporting				
	345.90	Unspecified seizure without mention of intractable epilepsy	Yes				
	493.90	Sepsis	Yes				
	465.9	Upper respiratory infections of unspecified site	Yes				
	276.7	Hyperpotassemia	Yes				
	996.51	Lack of normal physiological development, unspecified	Yes				
	711	Methicillin susceptible Staphylococcus aureus in conditions classified elsewhere and of unspecified site	Yes				
	733.90	Disorder of bone and cartilage, unspecified	Yes				



# Objective

- Evaluate inpatient pediatric resident notes to determine **which high-risk diagnoses are commonly missed**
- Create an **intervention to improve documentation of these diagnoses**
- Examine the **efficacy of interventions** in improving documentation of these diagnoses



## Methods

- **Setting**
  - Tertiary care academic children's hospital within a hospital
- **Charts Reviewed**
  - Inclusion criteria
    - Discharges from ward or PICU
    - Notes written by residents
  - Exclusion criteria
    - NICU, CT-ICU
    - LOS <2 days
    - Notes written by attendings, fellows, ancillary staff



## Methods

- **Baseline**
  - 220 charts from discharges between 7/1 – 12/31/2013
    - 67% of charts had at least 1 missing high-risk diagnosis
  - Identified 13 most frequently missed high-risk diagnoses

Target Diagnoses
Acute Kidney Injury
Acidosis
Alkalosis
Malnutrition
Chronic Renal Failure
Epilepsy
Sepsis
Shock
Heart Failure
Hypertension
Pancytopenia
Anemia
Neutropenia



# Methods

- Created a rubric
  - Systematically focus on these diagnoses
  - Standardize the review process
- 4 PHM attendings were trained
  - Not present
  - Present and documented
  - Present but not documented
- Inter-rater agreement of >90%

Documentation Task Force – Improving Inpatient Documentation

Rubric for Reviewing Resident Notes

Review all peds resident-written MD notes. If admission > 2 weeks, can review H&P, 2 progress notes/week, and discharge summary.

<input type="checkbox"/> Vitals	<input type="checkbox"/> Labs
<ul style="list-style-type: none"> <li>✓ Sepsis vitals?</li> <li>✓ Hypertension on 3+ occasions?</li> </ul>	<ul style="list-style-type: none"> <li>✓ CBC</li> <li>○ Anemia? Why?</li> <li>○ Pancytopenia? Why?</li> <li>○ WBC consistent with SIRS/sepsis?</li> </ul>
<input type="checkbox"/> Growth chart	<input type="checkbox"/> BMP
<ul style="list-style-type: none"> <li>✓ &lt;2.3%ile (mild/moderate)</li> <li>✓ &lt;.14%ile (severe)</li> </ul>	<ul style="list-style-type: none"> <li>○ Acidosis or alkalosis?</li> <li>○ Creatinine elevated x2 or more? Is it acute or chronic?</li> </ul>
<input type="checkbox"/> Med list	<input type="checkbox"/> Microbiology
<ul style="list-style-type: none"> <li>✓ Do they have AEDs ordered (ie do they have epilepsy)?</li> </ul>	<ul style="list-style-type: none"> <li>○ Sepsis/bacteremia?</li> </ul>
<input type="checkbox"/> Other	
<ul style="list-style-type: none"> <li>✓ On a ventilator? Respiratory failure (acute vs chronic)</li> <li>✓ Shock?</li> <li>✓ Heart failure?</li> </ul>	

Select MCC/CC Diagnoses

<b>Neuro</b> - *Coma - Epilepsy	<b>GI</b> - *Severe malnutrition - Other malnutrition	<b>ID</b> - *Sepsis - *Severe sepsis - *Septic shock - SIRS - Bacteremia
<b>Respiratory</b> - *Acute respiratory failure - Chronic respiratory failure	<b>Renal</b> - *End stage renal disease - Acute kidney injury/failure - Chronic renal failure	
<b>Cardiovascular</b> - *Cardiogenic shock - *Hypovolemic shock - *Distributive shock - *Traumatic shock - Shock, unspecified - Hypertension - *Acute systolic heart failure - Chronic systolic heart failure - Systolic heart failure	<b>Heme/Onc</b> - *Chemotherapy-induced pancytopenia - *Other drug induced pancytopenia - Other pancytopenia - Acute post-hemorrhagic anemia - Chronic blood loss - Anemia of prematurity - Aplastic anemia - Deficiency anemias - Hemolytic anemia - Neutropenia	* = MCC = preferred diagnosis if applicable
<b>FEN</b> - Acidosis - Alkalosis		



# Methods

- Interventions
  - Started 6/2014
  - Physician education
  - Reference cards
  - Note templates

**HIGH RISK DIAGNOSES FOR PEDIATRICS**  
\*Remember to include these in your notes when applicable\*

<b>SEPSIS</b> Any 2: Temp > 38 or < 36, THR, TRR, L or TWBC or > 10% bands (one must be temp or WBC count)	<b>RESPIRATORY FAILURE</b> Acute: PaO2 < 40 OR PaCO2 > 45 OR requiring intubation Chronic: Same as above - may have compensatory metabolic process, also include chronically vent-dependent kids
<b>SIRS</b> SIRS + suspected/proven infection	
<b>Sepsis</b> Severe: Sepsis + end organ damage (AMS, ARF)	

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**Neuro:** \*\*\*  
-Tylenol PRN\*\*\*

**Resp:** {Blank single: 19197:."O2 via \*\*\*\*", "SORA"}.

**CV:** HDS: \*\*\*  
--Access: \*\*\*

**FEN/GI:**  
-Diet: \*\*\*  
-IVF: \*\*\*  
-Lytes: {Blank single: 19197:."electrolyte abnormalities include: \*\*\*\*", "no electrolyte abnormalities"}

**Renal:** {Blank single: 19197:."AKI due to \*\*\*\*", "ARF due to \*\*\*\*", "acute on chronic renal failure", "CKD due to \*\*\*\*", "good urine output, Cr stable"}

-strict I/O

**Heme:** {Blank single: 19197:."anemia due to hemolysis", "anemia due to hemorrhage", "aplastic anemia", "pancytopenia due to \*\*\*\*", "stable H/H"}

**ID:** {Blank single: 19197:."SIRS", "sepsis due to \*\*\*\*", "severe sepsis due to \*\*\*\*", "septic shock due to \*\*\*\*", "No signs/symptoms of infection shock due to \*\*\*\*", "No signs/symptoms of infection"}



## Methods

- Selected 100 charts from 7/1-12/31/2013, 2014, 2015
  - Included all mortalities from ward or PICU
- Average within-disease probability of missed high-risk diagnoses was compared across time (pre- and post-intervention) using a mixed effects logistic regression model with disease random intercept



## Methods

- Primary outcome
  - Reduction in undocumented target high-risk diagnoses
- Secondary outcomes
  - Efficacy of EMR templates
  - Changes in expected mortality\*

(\*as measured by Clinical Data Base and Resource Manager™ owned by Vizient, formerly known as University Health-System Consortium)

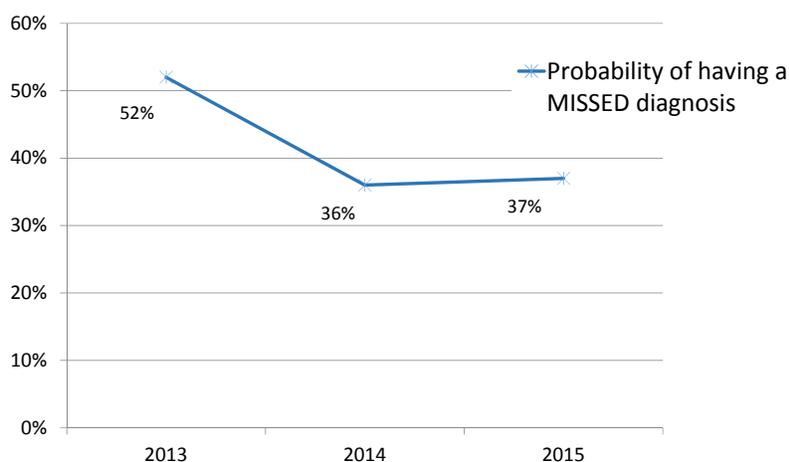


## Results

Table 2: Differences in the Probability of a "Present but not Documented" Diagnosis Over Time

Diagnosis	Probability of Undocumented Diagnosis Pr (95% CI)			2014 vs 2013		2015 vs 2013		2015 vs 2014	
	2013	2014	2015	Odds Ratio	P	Odds Ratio	P	Odds Ratio	P
All Diagnoses	0.52 (0.47, 0.57)	0.36 (0.32, 0.40)	0.37 (0.32, 0.42)	0.51	<.001	0.50	<.001	0.99	0.94
Epilepsy	0.30 (0.02, 0.58)	0.23 (0.05, 0.40)	0.19 (-0.00, 0.38)	0.69	0.66	0.54	0.51	0.78	0.77
Shock	0.57 (0.20, 0.94)	0.83 (0.54, 1.13)	0.87 (0.65, 1.10)	3.75	0.32	5.25	0.21	1.40	0.83
Hypertension	0.44 (0.27, 0.61)	0.25 (0.13, 0.37)	0.30 (0.17, 0.44)	0.42	0.07	0.55	0.21	1.30	0.58
Heart Failure	0.92 (0.76, 1.07)	0.62 (0.29, 0.96)	0.55 (0.25, 0.84)	0.15	0.14	0.11	0.07	0.72	0.73
Acidosis	0.41 (0.23, 0.59)	0.25 (0.06, 0.44)	0.14 (-0.01, 0.28)	0.47	0.24	0.22	0.04	0.47	0.36
Alkalosis	0.63 (0.39, 0.86)	0.60 (0.35, 0.85)	0.50 (0.10, 0.90)	0.90	0.89	0.60	0.60	0.67	0.68
Malnutrition	0.77 (0.60, 0.95)	0.80 (0.62, 0.98)	0.71 (0.52, 0.91)	1.18	0.83	0.74	0.66	0.63	0.53
*Acute Kidney Injury	0.61 (0.39, 0.84)	0.20 (0.06, 0.34)	0.24 (0.03, 0.44)	0.16	0.006	0.20	0.03	1.23	0.78
Chronic Renal Failure	Insufficient N	Insufficient N	Insufficient N						
*Pancytopenia	0.69 (0.46, 0.91)	0.75 (0.59, 0.91)	0.61 (0.39, 0.84)	1.36	0.66	0.71	0.64	0.52	0.32
Neutropenia	0.20 (-0.05, 0.45)	0.35 (0.14, 0.56)	0.41 (0.18, 0.65)	2.15	0.40	2.80	0.27	1.30	0.70
*Anemia	0.40 (0.24, 0.56)	0.18 (0.06, 0.30)	0.24 (0.10, 0.38)	0.33	0.04	0.48	0.16	1.47	0.50
*Sepsis	0.59 (0.44, 0.75)	0.39 (0.24, 0.54)	0.42 (0.26, 0.59)	0.44	0.07	0.50	0.16	1.15	0.77

## Results



- **49% decrease in the odds** of having a "present, not documented" diagnosis,  $p < 0.001$
- 2015: improvement **sustained**,  $p < 0.001$

## Results

- Secondary outcomes

- No significant difference between diagnoses included in EMR template vs those that were not ( $p=0.55$ )
- Expected mortality
  - 0.76 (2013) → 0.78 (2014) → 0.93 (2015)



## Conclusions

- Pediatric resident notes were less likely to omit high-risk diagnosis after our interventions
- Note template modifications did not provide added benefit to educational interventions alone
- Overall, curriculum development is an effective method of improving documentation with goal of ultimately improving the accuracy of health systems performance indices



## Conclusions

### • Limitations

- Generalizability- Single center design, resident notes only
- Simultaneous roll-out- Cannot comment on effectiveness of individual components of intervention
- Retrospective- Uncertainty in whether a diagnosis was truly present or not
  - “DRG Creep”- Diagnosis documented but not applicable
- Mortality index causality- Multiple variables affect mortality data so it is difficult to determine if interventions had direct causal impact on quality metrics



## Conclusions

### • Future Directions

- Target additional diagnoses
- Include attending and fellow documentation
- Implement a documentation review specialist to audit charts in real time
- Utilize EMR technology to assist in physician documentation based on existing data in other areas of the chart
- Survey the effect of these interventions on residents



Thank you!

