Impact of Implementation of an Evidence-Based Care Process Model for Pediatric Retropharyngeal/Parapharyngeal Abscess

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Disclosure

- I have received financial compensation from the American Academy of Family Physicians for speaking and for creation of CME materials.

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Introduction

[1] Woods et al, J Pediatric Infect Dis Soc 2015
[2] Novis et al, Int J Pediatr Otorhinolaryngol 2014
[3] Saluja et al, Laryngoscope 2013
[4] Grisaru et al, Int J Pediatr Otorhinolaryngol 2010
[5] Philpott et al, J Laryngol Otol 2004
[6] Hoffmann et al, Int J Pediatr Otorhinolaryngol 2011
[7] Federici et al, Arch Ped 2009

- Management not standardized in the US
- Incidence may be rising [1, 2]
- Charges/Costs rising[2]
- Published algorithms not comprehensive[3-7]

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Background

- Review of 472 cases in 9 years:
  - 93% Ceftriaxone + clindamycin
  - Strep and Staph, rare MRSA
  - Blood cultures rarely positive (0.6%)
  - Daily or more frequent labs
  - Complications rare
- Hypothesis: Narrower spectrum antibiotics and fewer tests will not lead to adverse outcomes

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Objectives

- Standardize management of RPA/PPA
  - Ampicillin/sulbactam -> Clindamycin if allergic
  - No blood cultures
  - CBC on admission only
  - CRP no more than every 36h

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Objectives

- Determine impact of CPM on
  - Antibiotic selection
  - Lab tests and cultures
  - Length of stay (LOS)
  - Cost
  - Readmissions
  - Rate of surgery

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Methods: Setting

- Single institution: 289 bed free-standing children's hospital
  - 13,600 inpatient admissions per year
  - 40,000 ED visits
  - 91% of all pediatric admissions and readmissions are captured by Intermountain Healthcare system

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Methods: Planning the Intervention

- Multidisciplinary team
- Literature review
- Local data review
- Standardized radiology language
- CPM approval
- Real-time Runcharts
- Quarterly PDSA cycles
- Feedback – division champions

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Methods:

- ICD-9 codes: 478.22, 478.24; ICD-10 code: J39.0
- First inpatient admission per patient
- Electronic collection of laboratory, pharmacy and imaging data
- Exclusions: <3 months old
- Manual review of readmissions

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Methods: Analysis

- Pre-intervention; Development; Post-intervention
  - Fisher's exact test, Kruskal Wallis rank sum test
- Statistical Process Control (SPC) charts
- Interrupted time series (ITS) analysis

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Results:

	Pre-CPM N=112	Development N= 46	Implementation N=100	P-value
Age				0.30
< 5 yr, n (%)	67 (60)	31 (67)	51 (51)	
5 to 11 yrs, n (%)	38 (34)	12 (26)	44 (44)	
>= 12 yrs, n (%)	7 (6)	3 (7)	5 (5)	
Male, n (%)	66 (59)	29 (63)	59 (59)	1
Ceftriaxone, n (%)	106 (95)	42 (91)	17 (17)	<0.001
Clindamycin, n (%)	110 (98)	42 (91)	27 (27)	<0.001
Ampicillin/Sulbactam, n (%)	7 (6)	10 (22)	85 (85)	<0.001
Blood culture, n (%)	60 (54)	24 (52)	24 (24)	<0.001
CRP, median [IQR]	3 [3, 4]	3 [2, 4]	2 [2, 3]	<0.001
CBC, median [IQR]	2 [1, 3]	1 [1, 2]	1 [1, 1]	<0.001

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Results:

	Pre-CPM N=112	Development N= 46	Implementation N=100	P-value
Cost, median [IQR]	5397 [4318, 7608]	5863 [4021, 7330]	5489 [4036, 7922]	0.81
LOS, median [IQR]	59 [42, 83]	58 [40, 70]	57 [40, 79]	0.66
Revisit ED, n (%)	11 (10)	0 (0)	7 (7)	0.07
Readmission, n (%)	6 (5)	0 (0)	4 (4)	0.33
Surgery, hospital day 0-1, n (%)	37 (33)	16 (34)	33 (33)	0.97
Surgery, hospital day 2 or later, n (%)	15 (13)	4 (9)	18 (18)	0.34

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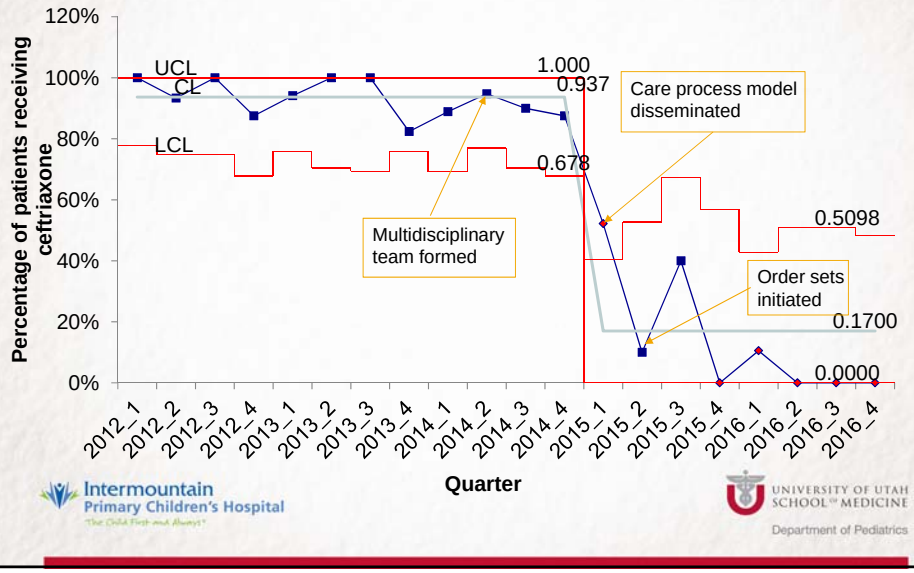
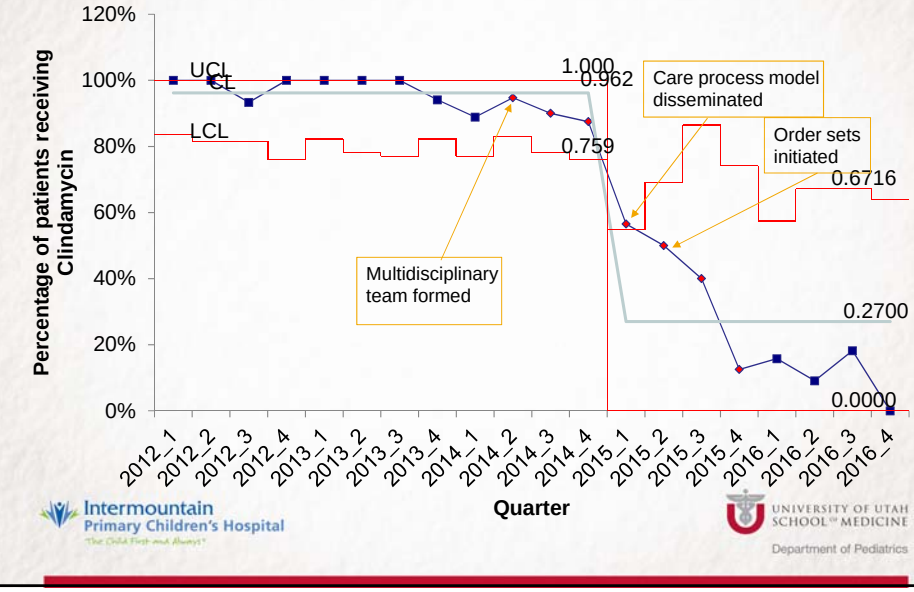
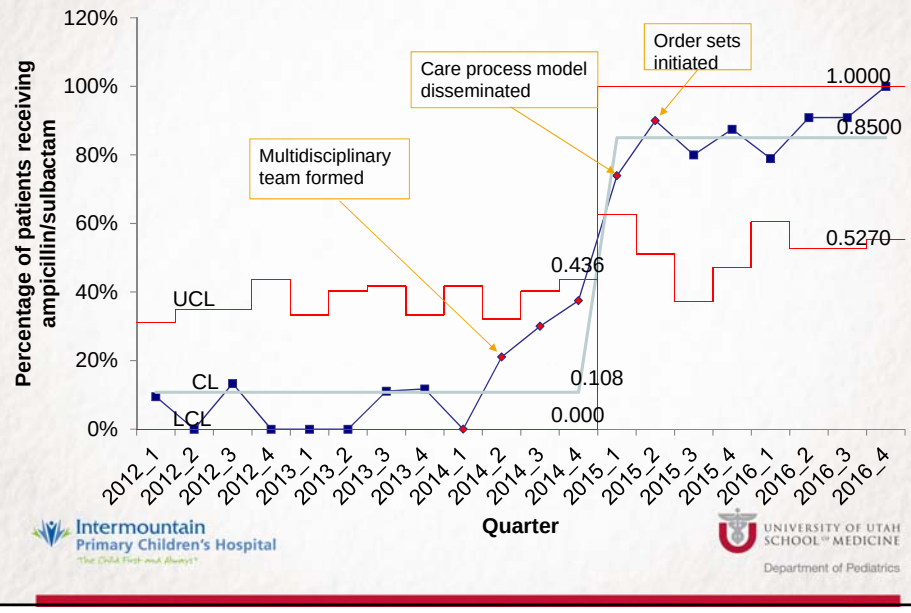
Results: Ceftriaxone Use



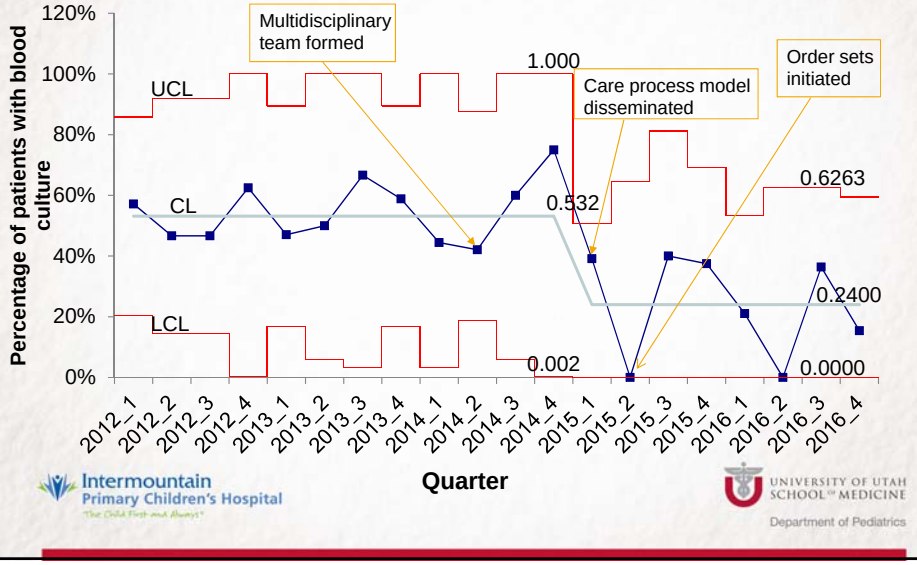
Results: Clindamycin Use



Results: Ampicillin/Sulbactam Use



Results: Blood Cultures



Results: ITS

- No trends prior to intervention in any category
- Decreases in ceftriaxone, clindamycin level and trend
- Increase in ampicillin/sulbactam level and trend
- Decrease in blood culture, CRP level
- No changes in LOS, readmission, cost level or trend

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Limitations

- Electronic database, possibility of mis-coding
- 91% capture of readmissions
- Generalizability: antibiogram

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Conclusions

- CPM changed antibiotic use from ceftriaxone + clindamycin to ampicillin/sulbactam
- CPM reduced blood cultures and lab testing
- No change in readmission, cost, LOS, or surgical management

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Future Directions

- Culture of the culture – needs further investigation
- Standardize admission service
- Expansion to healthcare network

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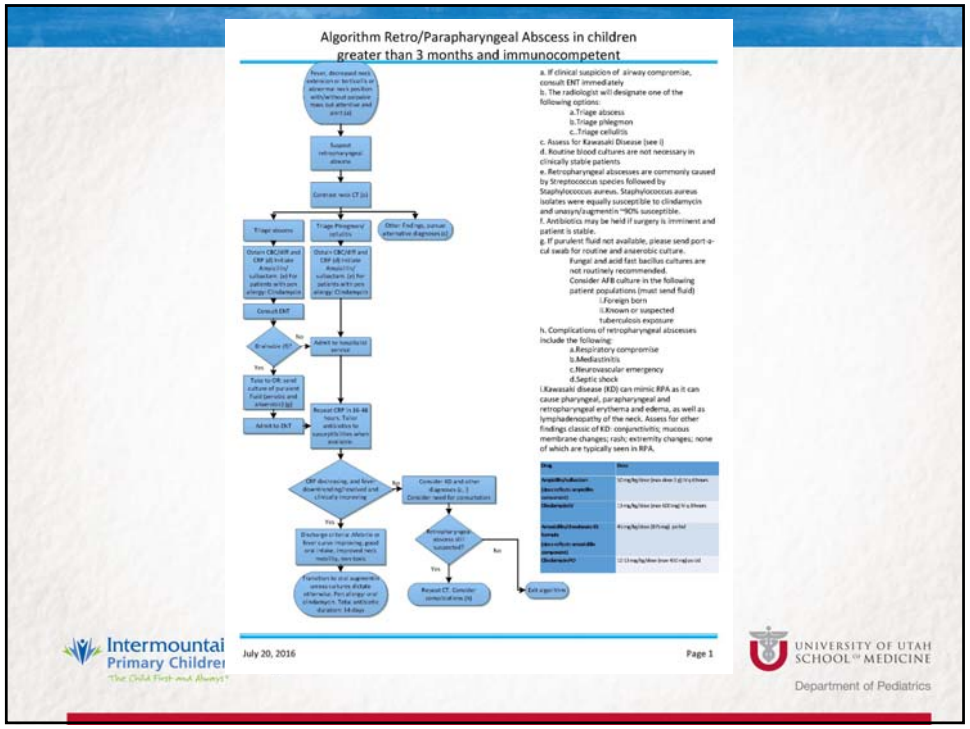

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Thank You

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Results: Ceftriaxone Use 2012-2013 vs 2015-2016

	Unstandardized Coefficients		Standardized Coefficients		
	B	Std. Error	Beta	t	Sig.
Constant	94.663	3.953		23.946	.000
Level change	-26.228	4.784	-.614	-5.483	.000
Trend change	-6.249	1.725	-.405	-3.622	.003

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Results: Blood Cultures 2012-2013 vs 2015-2016

	Unstandardized Coefficients		Standardized Coefficients		
	B	Std. Error	Beta	t	Sig.
Constant	54.450	4.714		11.552	.000
Level change	-15.381	3.333	-.777	-4.615	.000

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Results: Length of Stay 2012-2013 vs 2015-2016

	Unstandardized Coefficients		Standardized Coefficients		
	B	Std. Error	Beta	t	Sig.
Constant	82.535	20.088		4.109	.001
Level change	-1.093	13.043	-.045	-.084	.935
Trend change	-2.345	5.626	-.266	-.417	.684

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