Hospital-based Medicine: Clinical & HSR

Tuesday, August 11 2:30-4:00 pm EDT

Moderators
Sunitha Kaiser
Eyal Cohen

EDT	Abstract	Title	Presenting Author
2:30 pm		Introduction & General Information	
2:35 pm	3375532	Pediatric Readmission Risk Modeling Using Clinical and Sociodemographic Factors	Lauren Solan
2:45 pm	3379711	Validation of a Childhood Pneumonia Prognostic Tool for Use in Emergency Care Settings in the United States	Derek Williams
2:55 pm	3372766	Use of Clinical Factors to Estimate the Risk of True Bacteremia in Febrile Infants with Positive Blood Cultures	Jeffrey Yaeger
3:05 pm	3383476	Testing the feasibility of using machine learning techniques to estimate risk of invasive bacterial infection for febrile infants	Russell McCulloh
3:15 pm	3370753	The Bronchiolitis Follow-up Intervention Trial (BeneFIT): A Multicenter Randomized Clinical Trial	Eric Coon
3:25 pm	3373762	Day of illness on admission and outcomes in bronchiolitis hospitalizations	Alan Schroeder
3:35 pm	3368142	Interventions to help smoking parents of inpatients to reduce exposure: Results from the INSPIRE trial	Karen Wilson
3:45 pm		Wrap Up	

Note: Schedule subject to change based on presenter availability.

CONTROL ID: 3375532

TITLE: Pediatric Readmission Risk Modeling Using Clinical and Sociodemographic Factors

PRESENTER: Lauren Solan

AUTHORS (LAST NAME, FIRST NAME): Solan, Lauren[1]; Fortuna, Robert J.[3]; Thevenet-Morrison, Kelly[2]; Kittel, Julie[2]; van Wijngaarden, Edwin[2]; Halterman, Jill[4]

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CURRENT CATEGORY: Hospital-based Medicine

CURRENT SUBCATEGORY: None

KEYWORDS: readmission risk, sociodemographics, electronic health record.

SESSION TITLE: Hospital-based Medicine: Clinical & HSR |Hospital-based Medicine: Clinical & HSR

SESSION TYPE: Webinar|Platform

ABSTRACT BODY:

Background: Pediatric readmissions are burdensome to families and health care systems. Identifying predictors of risk may guide interventions to decrease readmissions. Prediction of readmission risk is often based on clinical factors alone although sociodemographic variables play an important role in pediatric healthcare and outcomes. However, these variables are not commonly available in the electronic health record (EHR) and are not routinely included in risk prediction.

Objective: To validate a previously studied adult-based readmission risk model in a prospective pediatric cohort, and to build a new pediatric readmission risk model that includes both clinical and sociodemographic factors.

Design/Methods: We enrolled a prospective cohort of caregivers of hospitalized patients <18 years of age, excluding newborns, and asked caregivers to complete an electronic survey assessing sociodemographic variables. A previously-studied adult-based readmission risk assessment tool was validated in this prospective cohort using receiver operator characteristic (ROC) analyses. We then performed principal component analyses (PCA) and stepwise methods on survey responses to create novel sociodemographic variables for use in logistic regression and ROC analyses, determined their association with 30-day readmissions and created a new pediatric risk assessment tool.

Results: We enrolled 343 caregivers (response rate 67%); 31 patients (9%) experienced a 30-day readmission. Those who did and did not experience a readmission had similar demographic characteristics. ROC analyses validated the application of the adult-based risk assessment tool in our prospective pediatric cohort, maintaining a statistically significant area under the curve (AUC) of 0.7. Logistic regression analyses yielded 3 additional predictors of readmission: delaying medical care, caregivers with depressive symptoms, and confidence in patient/physician interactions (Figure 1). Incorporating these variables into the previously validated model strengthened the model's predictive capacity (AUC = 0.78) (Figure 2) and resulted in a new pediatric readmission risk assessment model.

Conclusion(s): An adult-based readmission risk model yielded a moderate predictive capacity for 30-day readmissions within our pediatric prospective cohort. The addition of sociodemographic variables strengthened the predictive nature of the model. Inclusion of sociodemographic variables within the EHR is an important step to support predictive analytic risk assessments and guide interventions to reduce readmissions.

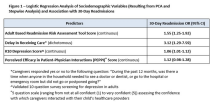

Figure 1 – Logistic Regression Analysis of Sociodemographic Variables (Resulting from PCA and Stepwise Analysis) and Association with 30-Day Readmissions

Predictors	30-Day Readmission OR (95% CI)
Adult-based Readmission Risk Assessment Tool Score (continuous)	1.55 (1.25-1.92)
Delay in Receiving Care* (dichotomous)	5.12 (1.29-7.53)
PHQ Depression Score† (continuous)	1.09 (1.01-1.11)
Perceived Efficacy in Patient-Physician Interactions (PEPPI)‡ Score (continuous)	1.12 (0.98-1.28)

*Caregivers responded yes or no to the following question: "During the past 12 months, was there a time when you needed medical care right away for your child but you did not go to the hospital or emergency room but did not go or postponed going?"
†Validated 10-question survey, screening for depression in adults
‡ 5-question scale (ranging from not at all confident (1) to very confident (5)) assessing the confidence with which caregivers interacted with their child's healthcare providers

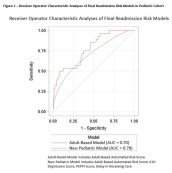

IMAGE CAPTION:

CONTROL ID: 3379711

TITLE: Validation of a Childhood Pneumonia Prognostic Tool for Use in Emergency Care Settings in the United States

PRESENTER: Derek J Williams

AUTHORS (LAST NAME, FIRST NAME): Williams, Derek J.[3]; Zhu, Yuwei[3]; Ampofo, Krow[2]; Sartori, Laura[1]; Johnson, Jakobi[3]; Heller, Evan[2]; Nian, Hui[3]; Arnold, Donald H.[3]; Stassun, Justine C.[3]; Antoon, James W.[3]; Pavia, Andrew T.[2]; Grijalva, Carlos G.[3]

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CURRENT CATEGORY: Hospital-based Medicine

CURRENT SUBCATEGORY: None

KEYWORDS: Pneumonia, Emergency Medicine, Prediction.

SESSION TITLE: Hospital-based Medicine: Clinical & HSR |Hospital-based Medicine: Clinical & HSR

SESSION TYPE: Webinar|Platform

ABSTRACT BODY:

Background: We previously developed a prognostic tool that accurately estimates risk for severe outcomes in children hospitalized with pneumonia.

Objective: To prospectively validate our prognostic tool in a new population of children presenting for emergency care.

Design/Methods: The previously developed prognostic tool uses ordinal logistic regression to estimate risk for severe (invasive mechanical ventilation or shock requiring vasoactive medications); moderate (intensive care admission without severe features); or mild (children without moderate or severe features) disease using clinical, laboratory, and radiologic predictor data collected at the time of presentation. Two versions of the tool were created, one using 10 predictors based on expert consensus (Expert) and the other using 9 predictors available as coded data fields in the electronic health record (EHR). For this study, we prospectively enrolled children (2mo to <18yr) with clinical and radiographically-confirmed pneumonia presenting for emergency care at two US children's hospitals between September 2017 and May 2019. Predictor data for each tool was collected at presentation. In-hospital outcomes were assessed through chart review following discharge. Discriminative ability of each tool was measured using concordance (c-statistic) and compared to concordance estimated from the original development cohort. Calibration plots were created to contrast observed vs predicted probabilities for moderate or severe pneumonia.

Results: There were 995 children included in the Expert tool and 593 children in the EHR tool (fewer children included due to missing white blood cell count data). Baseline characteristics and outcome frequencies are detailed in Table 1. Discriminative ability of both tools was good, with identical discrimination when compared to performance in the development cohort (Table 2). Both tools also demonstrated excellent calibration (Figure 1). Median (interquartile range)

predicted probability for moderate or severe pneumonia was 0.13 (0.06, 0.29) for the Expert tool and 0.22 (0.10, 0.41) for the EHR tool; predicted probabilities were significantly higher for those experiencing these outcomes compared to children with the mild outcome (Figure 2).

Conclusion(s): Both the Expert and EHR prognostic tools accurately estimate risk for severe outcomes among children with pneumonia presenting for emergency care. Next steps include testing the clinical effectiveness of these validated tools in a forthcoming randomized controlled trial.

Table 1. Distribution of Predictors and Outcome Frequencies for Expert and EHR Prognostic Tool Validation

	Expert Tool, N=995	EHR Tool, N=593
PREDICTOR VARIABLES		
Age in Months	43 (19-92)	51 (21-112)
Female Sex	*	291 (49)
Race	*	
Non-Hispanic White		392 (66)
Non-Hispanic Black		79 (13)
Hispanic		86 (15)
Other		36 (6)
No. Comorbidities		*
0	538 (54)	
1	255 (26)	
2	120 (12)	
3+	82 (8)	
Temperature (Celsius)	*	38 (37-38)
Heart Rate	143 (124-160)	141 (123-161)
Respiratory Rate	34 (26-46)	34 (26-44)
Systolic Blood Pressure	108 (100-117)	108 (99-117)
P:F Ratio^	451 (406-468)	445 (383-468)
Chest Indrawing	453 (46)	*
Altered Mental Status	15 (2)	*
White Blood Cell Count	*	12 (9-17)
Chest X-ray Infiltrate Pattern		*
Consolidation, sangle lobar	447 (45)	
Consolidation, Multilobar	200 (20)	
Other Infiltrate	242 (24)	
Mixed	106 (11)	
Parapneumonic Effusion	108 (11)	*
OUTCOME		
Mild	787 (79)	418 (70)
Moderate	160 (16)	129 (22)
Severe	48 (5)	46 (8)

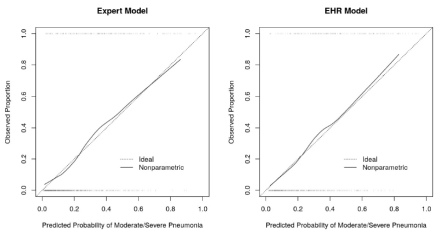
^Estimated from SpO2:FiO2 ratio *Indicates variable not included in tool; Median (interquartile range) presented for continuous variables. Frequency (percentage) presented for categorical variables.

Table 2. Discrimination of the Expert and EHR Prognostic Tools

Prognostic Tool	No. Predictors (df)	Validation Cohort (Current)		Development Cohort (Original)	
		No. Children	C-statistic (95% CI)	No. Children	C-statistic (95% CI)
Expert	10 (22)	995	0.79 (0.76, 0.83)	2238	0.79 (0.77, 0.81)
EHR	9 (19)	593	0.78 (0.74, 0.82)	1902	0.78 (0.76, 0.80)

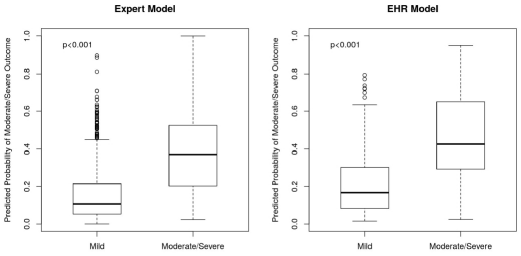
Footnote: Discrimination is a measure of how well a model discriminates between those with and without the outcome of interest and is measured using the c-statistic. The c-statistic is analogous to the area under the ROC curve and ranges from 0.5 (equivalent to a coin flip) to 1.0 (perfect discrimination). Abbreviation: df, degrees of freedom

Figure 1. Calibration Plots of Expert and EHR Prognostic Tools



Footnote: The solid line represents a non-parametric smooth curve between observed proportions and predicted probabilities for moderate or severe pneumonia. Perfect calibration is represented by the dotted line through the origin. The distribution of subjects is indicated with spikes at the top of the figures for those with moderate or severe outcome and at the bottom for those with mild outcome.

Figure 2. Predicted Probabilities for Moderate or Severe Pneumonia Estimated from Expert and EHR Tools by Outcome Group



Footnote: The boxplots display the distribution of predicted probabilities for moderate or severe pneumonia estimated from the Expert and EHR tools by outcome group (mild vs. moderate or severe) as follows: median (thick horizontal line), interquartile range (bounded by box), 1.5*interquartile range (whiskers), and outliers (open circles).

IMAGE CAPTION:

CONTROL ID: 3372766

TITLE: Use of Clinical Factors to Estimate the Risk of True Bacteremia in Febrile Infants with Positive Blood Cultures

PRESENTER: Jeffrey P Yaeger

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CURRENT CATEGORY: Hospital-based Medicine

CURRENT SUBCATEGORY: None

KEYWORDS: Risk Calculator, Bacteremia, Contaminant.

SESSION TITLE: Hospital-based Medicine: Clinical & HSR |Hospital-based Medicine: Clinical & HSR

SESSION TYPE: Webinar|Platform

ABSTRACT BODY:

Background: Positive blood cultures lead to unnecessary interventions when results are due to a contaminant. Biomolecular assays can identify contaminants but they are costly and do not detect all nonpathogenic bacteria.

Objective: To: 1. Estimate true bacteremia risk with a predictive model that uses clinical factors and time-to-positivity (TTP), and; 2. Compare its performance with the <24-hour rule (reference standard).

Design/Methods: This is a matched cohort study of infants who were brought to the emergency departments at two children's hospital from January 2014-December 2018. Inclusion criteria consisted of age 0-90 days, temperature ≥38°C, and collection of a blood culture. Infants with positive blood cultures were matched 1:2 with infants with negative bloods culture based on age and sex. Informed by the literature, 10 variables (Table 1) were used to develop a predictive model using a random forest (RF) classification algorithm. Tuning parameters were chosen by cross-validated area-under-the receiver operating characteristic curve (AUC). For negative blood cultures, a TTP of 130 hours was used. The main outcome was true bacteremia, defined as growth of a single pathogen that was treated clinically as an infection. Using five-fold cross-validation, four folds were used for training. The fifth fold consisted only of infants with a positive blood culture and was used for testing. AUC, sensitivity, specificity, positive predictive value (PPV), and negative predictive value (NPV) were calculated. Results were compared with the <24-hour rule as the reference standard in which a TTP of ≤24 hours was used as the sole predictor.

Results: Of 173 febrile infants, 59 had a positive blood culture and 22 had true bacteremia. The AUCs for the 24-hour rule and RF model were 0.72 (95% CI 0.64-0.8) and 0.97 (95% CI 0.93-1), respectively. At a risk threshold of 0.19 for the RF model, the sensitivity was 1 (95% CI 1-1), specificity was 0.865 (95% CI 0.757-0.973), PPV was 0.815 (95% CI 0.710-0.956), and NPV was 1 (95% CI 1-1) compared with 1 (95% CI 1-1), 0.432 (95% CI 0.270-0.595), 0.512 (95% CI 0.449-0.595), and 1 (95% CI 1-1), respectively, for the <24-hour rule.

Conclusion(s): Findings from this multi-site study suggest that easily obtained clinical risk factors can be used to enhance the risk estimate of true bacteremia in infants with positive blood cultures. Formatted as a risk calculator, this tool could be used to safely avoid further treatment when true bacteremia risk is sufficiently low.

Table 1. List of Predictor Variables

Sex (male/female)
Age (days)
Gestational age (weeks)
Appearance (well/ill)
Maximum temperature (Celsius)
Duration of illness (days)
Cough present (yes/no)
Leukocyte esterase present (yes/no)
Pyuria present (yes/no)
Time to positivity (hours)

IMAGE CAPTION:

CONTROL ID: 3383476

TITLE: Testing the feasibility of using machine learning techniques to estimate risk of invasive bacterial infection for febrile infants

PRESENTER: Russell James McCulloh

AUTHORS (LAST NAME, FIRST NAME): McCulloh, Russell J.[1]; Perin, Jamie[2]; Biondi, Eric[3]

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CURRENT CATEGORY: Hospital-based Medicine

CURRENT SUBCATEGORY: None

KEYWORDS: fever, infant, sepsis.

SESSION TITLE: Hospital-based Medicine: Clinical & HSR |Hospital-based Medicine: Clinical & HSR

SESSION TYPE: Webinar|Platform

ABSTRACT BODY:

Background: Tens of thousands of well-appearing febrile infants 7-60 days old are hospitalized annually to rule out bacterial meningitis and bacteremia (invasive bacterial infection, IBI). Current approaches to suspected IBI in febrile infants rely on traditional linear modeling techniques which use a small number of variables and face limitations due to missing data and scant observations. However, most infants present with a vast number of clinically relevant factors.

Objective: To assess the feasibility of a next-generation risk prediction tool using a nationally representative, contemporary patient population and machine learning techniques.

Design/Methods: 126 hospitals contributed data on well-appearing febrile infants aged 7-60 days 12/2015-12/2017. A limited set of features were available for algorithm development including infant age group (7-30 or 31-60 days), gender, history of prior infection, presence of abnormal inflammatory markers, urinalysis, respiratory symptoms, and diagnosis of IBI. The Rochester criteria was approximated using inflammatory marker, history of infection, and urinalysis data. Boosted regression trees were used to identify patterns among infants that were related to the presence of IBI. Model development used a random subset of 50% of infants; prediction accuracy was described with the remaining 50% using ROC curves. Infants with a predicted probability of IBI lower than the median predicted probability of IBI were labeled as low risk. Test characteristics were then compared to those of the approximate Rochester criteria (ARC).

Results: 21,624 encounters were included; 10,000 were used to construct the IBI risk assessment algorithm, 11624 were used to validate the algorithm and compare with the ARC. The ARC identified 5618 (48%) of infants as low risk, 208 (3.7%) had IBI. Of 6003 (52%) identified as non-low risk by the ARC, 770 (12.8%) had IBI, resulting in a sensitivity of 78.7%, specificity of 50.8% and AUC of 0.65. The boosted regression tree algorithm identified 6733 (58%) of infants as low risk, 225 (3.3%) had IBI. Of 4891 (42%) identified as non-low risk, 753 (15.3%) had IBI, resulting in a sensitivity of 77.0%, specificity of 61.1%, and AUC of 0.691.

Conclusion(s): A next-generation algorithm using large-scale data and machine learning techniques can outperform

current risk stratification criteria for well-appearing febrile infants. Development of a future algorithm based on a broader array of variables may allow for individualized IBI risk prediction.

(No Image Selected)

CONTROL ID: 3373762

TITLE: Day of illness on admission and outcomes in bronchiolitis hospitalizations

PRESENTER: Alan Schroeder

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CURRENT CATEGORY: Hospital-based Medicine

CURRENT SUBCATEGORY: None

KEYWORDS: Bronchiolitis, length-of-stay, Symptom duration.

SESSION TITLE: Hospital-based Medicine: Clinical & HSR |Hospital-based Medicine: Clinical & HSR

SESSION TYPE: Webinar|Platform

ABSTRACT BODY:

Background: Bronchiolitis is often described to follow an expected clinical trajectory, with a peak in severity between days 3-5. Day of illness (DOI) is sometimes included in patient presentations in the inpatient setting, and the predicted trajectory may influence anticipatory guidance and clinical decision-making.

Objective: We aimed to determine the association between the DOI at admission and hospital length-of-stay (LOS), need for positive-pressure ventilation (PPV), and total cough duration.

Design/Methods: We compiled data on DOI at admission and outcomes from two multicenter prospective studies (a pilot observational study and an RCT) examining follow-up strategies after bronchiolitis hospitalizations in infants and children under 2 years of age. In both studies, variables were extracted from the medical record, with the exception of total cough duration, which was obtained via weekly phone follow-up calls after discharge. Patients were excluded for complex conditions.

We used multivariable logistic and linear regression models, as appropriate, to test the associations between DOI and outcomes, with adjustment for age, gender, and testing positive for ≥ 2 viruses. Using a clinical risk score adapted from Freire et al (*Pediatrics* 2018), severity of illness at admission was collected on a random sample of 100 patients and was not associated with DOI at admission (P=0.91) so was not included as a covariate.

Results: The median (IQR) DOI at admission for the 749 patients was 4 (2-5) days. On multivariable analysis (Table), DOI was not associated with LOS (coefficient .01 days, 95% CI -.05 – .07 days) (Figure), PPV (aOR .98, 95% CI .89 – 1.08), or total cough duration (coefficient 0.33 days, 95% CI -.01 - .66 days). The addition to the model of prior wheezing, eczema, and prematurity for the 563 patients on whom those variables were available had no impact on findings. There was no significant difference in DOI at discharge in readmitted (n=16 [3.8%] of the 424 patients for whom readmission data were available) vs non-readmitted patients (5.9 vs 6.4 days, P=.54). The median cough duration post-discharge was 6 days, with 25% of patients experiencing cough for 10+ days.

Conclusion(s): We found no associations between DOI at presentation and outcomes in bronchiolitis hospitalizations, likely reflecting the heterogeneity of this condition in the inpatient setting. Practitioners should exercise caution when making clinical decisions or providing anticipatory guidance based on symptom duration.

Table *Association between day of illness at admission and outcomes with adjustment for covariates*

Variable	Length-of-stay in days, coefficient (95% CI)	P-value	Positive-pressure ventilation, aOR (95%CI)*	P-value	Total cough duration in days, coefficient (95% CI)**	P-value
Day of illness at admission	.01 (-.05 - .07)	.73	1.0 (.9 – 1.1)	.67	.33 (-.01 - .66)	.06
Age (months)	-.05 (-.07 - -.02)	<.001	1.0 (.9 – 1.0)	.18	0 (-.11 - .11)	.98
Male sex	-.24 (-.56 - .08)	.15	.5 (.3 - .8)	.006	.1 (-1.4 – 1.6)	.9
2 + viruses	.85 (.32 – 1.4)	.002	4.0 (2.2 – 7.3)	<.001	4 (1.6 – 6.3)	.001

Abbreviations: CI, confidence interval; aOR, adjusted odds ratio
*Data available for the 551 included and excluded subjects in the RCT
**Data available for the 456 included subjects from both studies for whom phone follow-up data were obtained

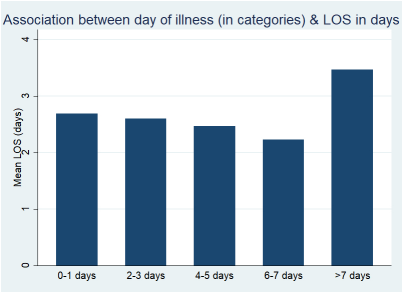

IMAGE CAPTION:

CONTROL ID: 3370753

TITLE: The Bronchiolitis Follow-up Intervention Trial (BeneFIT): A Multicenter Randomized Clinical Trial

PRESENTER: Eric Coon

AUTHORS (LAST NAME, FIRST NAME): Coon, Eric[1]; Destino, Lauren[2]; Greene, Tom[1]; Vukin, Beth[1]; Stoddard, Gregory J.[1]; Schroeder, Alan[2]

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CURRENT CATEGORY: Hospital-based Medicine

CURRENT SUBCATEGORY: None

KEYWORDS: bronchiolitis, randomized trial.

SESSION TITLE: Hospital-based Medicine: Clinical & HSR |Hospital-based Medicine: Clinical & HSR

SESSION TYPE: Webinar|Platform

ABSTRACT BODY:

Background: Post-hospitalization follow-up visits are frequently prescribed and have been proposed and used as a quality metric in the setting of bronchiolitis. The benefits and harms of this practice are uncertain.

Objective: To determine whether an as-needed post-hospitalization follow-up visit is non-inferior to a scheduled post-hospitalization follow-up visit with respect to reducing anxiety among parents of children hospitalized for bronchiolitis.

Design/Methods: We conducted a randomized controlled trial (NCT03354325) involving children under 24 months old who were hospitalized for bronchiolitis at one of four hospitals (two children's hospitals and two community hospitals). Children with chronic conditions were not considered for enrollment. Participants were randomized to a scheduled follow-up visit within 4 days of discharge or an as-needed follow-up visit, in which parents were instructed to follow-up if the child's symptoms did not resolve or worsened. The primary outcome was parental anxiety 7 days after hospital discharge, measured using the anxiety portion of the Hospital Anxiety and Depression Scale (HADS); range 0 to 28 points, with higher scores indicating greater anxiety. Thirteen additional pre-specified secondary outcomes were assessed.

Results: The primary outcome was available for 268 (88%) of 303 randomized patients (Figure 1). Demographic and

clinical characteristics were well-balanced between groups (Table 1). Eighty-two percent of children in the scheduled group attended a scheduled post-hospitalization visit compared to 19% of children in the as-needed group (absolute difference 63%, 95% CI 53-72%; Table 2). The mean 7-day parental anxiety score was 3.9 among the as-needed follow-up group and 4.2 among the scheduled follow-up group (absolute difference -0.3 points, 95% CI -1.0 to 0.7), with the upper bound of the 95% CI within the pre-specified non-inferiority margin of 1.1 points. Among patients in the as-needed group, 9% received a new medication, compared to 16% of patients in the scheduled group (absolute difference -7%, 95% CI -15 to 1%). New ambulatory medications prescribed after hospital discharge included antibiotics (n=22; 19 for acute otitis media), albuterol (n=7), and inhaled corticosteroids (n=6).

Conclusion(s): As-needed post-hospitalization follow-up for bronchiolitis is non-inferior to scheduled follow-up. In addition to empowering families to decide when and if post-hospitalization follow-up is necessary, as-needed follow-up might decrease exposure to unnecessary medications.

Figure 1. Enrollment and Randomization

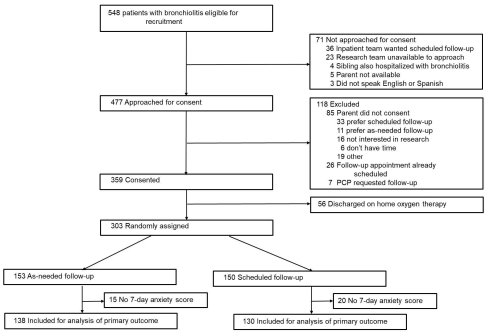

Table 1 Demographic and clinical characteristics according to study group

Characteristic	As-needed follow-up N=153	Scheduled follow-up N=150
Age, no. (%)		
<2 months	24 (16)	23 (15)
2-12 months	84 (55)	85 (57)
13-24 months	45 (29)	42 (28)
Female sex, no. (%)	67 (44)	58 (39)
Race, no. (%)		
American Indian/Alaska Native	1 (1)	2 (1)
Asian	12 (8)	11 (7)
Black/African American	3 (2)	4 (3)
Native Hawaiian/Pacific Islander	12 (8)	14 (9)
White	116 (76)	112 (75)
Other	9 (6)	7 (5)
Hispanic ethnicity, no. (%)	56 (37)	34 (23)
Need for interpretation, no. (%)	12 (8)	13 (9)
Government insurance, no. (%)	63 (41)	62 (41)
Either parent graduated college, no. (%)	73 (48)	77 (51)
Gestational age, no. (%)		
>37 weeks	110 (72)	102 (68)
34-37 weeks	31 (20)	40 (27)
<34 weeks	12 (8)	8 (5)
History of wheezing, no. (%)	38 (25)	43 (29)
History of eczema, no. (%)	30 (20)	32 (21)
Presence of a chronic medical condition, no. (%)	13 (9)	8 (5)
Positive viral testing, no. (%)[a]	105 (83)	102 (89)
Received care in intensive care unit, no. (%)	39 (25)	45 (30)
Max respiratory support during hospitalization, no. (%)		
No respiratory support needed	38 (25)	18 (12)
Nasal cannula	58 (38)	64 (43)
High-flow nasal cannula	35 (23)	44 (29)
BiPap or CPAP	20 (13)	22 (15)
Intubated and ventilated	2 (1)	2 (1)
Discharge medications related to bronchiolitis, no. (%)		
Beta-agonist	8 (5)	16 (11)
Inhaled steroid	2 (1)	0 (0)
Systemic steroids	1 (1)	0 (0)
Oral antibiotics	22 (14)	15 (10)
Total hospital length of stay, mean (SD) days	2.2 (1.9)	2.6 (2.9)
Day of illness at the time of discharge, mean (SD) days	5.8 (2.7)	6.3 (3.5)
Parental anxiety[b] at discharge, mean (SD)	7.5 (4.5)	7.1 (3.9)

[a]Denominators for positive viral testing variable are the number of patients who underwent viral testing, 127 and 115 patients among the as-needed and scheduled follow-up groups, respectively.
[b]Measured by the anxiety portion of the Hospital Anxiety and Depression Scale (HADS)

Table 2 Outcomes

Outcomes	As needed follow-up N=138	Scheduled follow-up N=130	Absolute Difference (95% CI)
Attendance of a scheduled follow-up visit, n (%)	26 (19)	106 (82)	-63% (-53 to -72)
7-day parental anxiety score,[a] mean	3.9	4.2	-0.3 points (-1.0 to 0.7)
Days from discharge to cough resolution, mean	9.2	9.8	-0.6 days (-2.4 to 1.2)
Days from discharge to child reported back to normal, mean	8.8	9.6	-0.9 days (-2.8 to 1.0)
Days from discharge to symptom resolution,[b] mean	10.2	10.8	-0.7 days (-2.6 to 1.2)
Any new ambulatory medication prescribed prior to symptom resolution, n (%)	13 (9)	21 (16)	-7% (-15 to 1)
Any immunization received within 1 month after discharge,[c] n (%)	42 (33)	42 (37)	-4% (-16 to 8)
Any hospital readmission prior to symptom resolution, n (%)	3 (2)	5 (4)	-2% (-6 to 2)
Any emergency department visit prior to symptom resolution, n (%)	8 (6)	5 (4)	2% (-3 to 7)
Number of missed daycare days prior to symptom resolution, mean	0.8	1.2	-0.4 days (-1.2 to 0.4)
Number of missed parental work days prior to symptom resolution, mean	1.6	2.1	-0.5 days (-1.4 to 0.4)
Report that care was perfect 1 month after discharge,[c, d] n (%)	125 (98)	114 (99)	-2% (-5 to 2)
Report dissatisfaction with care 1 month after discharge,[c, d] n (%)	14 (11)	19 (17)	-6% (-14 to 3)
Depth of relationship with primary care provider 1 month after discharge,[c, e] mean	26.5	26.0	0.5 points (-1.1 to 2.1)

*p=0.01
[a]Measured by the anxiety portion of the Hospital Anxiety and Depression Scale (HADS)
[b]Symptom resolution was defined as parental report that the child's cough had resolved and that the child was back to normal.
[c]Comparison limited to participants for whom contact was made 1 month after hospital discharge (N=128 in as-needed follow-up group and N=115 in scheduled follow-up group).
[d]Measured by the Patient Satisfaction Questionnaire Short Form (PSQ-18)
[e]Measured by the Patient-Doctor Depth-of-Relationship Scale

IMAGE CAPTION:

CONTROL ID: 3368142

TITLE: Interventions to help smoking parents of inpatients to reduce exposure: Results from the INSPIRE trial

PRESENTER: Karen Wilson

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ABSTRACT BODY:

Background: Tobacco smoke exposure (TSE) is associated with higher rates of respiratory diseases and other causes of illness among children. Hospitalized children have higher rates of TSE, and parents who smoke may be receptive to tobacco and secondhand smoke interventions during their child's hospitalization.

Objective: To test the efficacy of a smoking cessation intervention delivered to parents of hospitalized children.

Design/Methods: We conducted a randomized, controlled, single-blind clinical trial at Children's Hospital Colorado. Families were recruited from 12/2014 – 5/2018 and followed for 12 months. Families with at least one parent who used tobacco were eligible for participation. Consenting parents completed an in-depth questionnaire, and urine was collected from the child and analyzed for cotinine using liquid chromatography-tandem spectrometry, with a limit of quantification

of .05 ng/mL. Intervention participants received brief motivational interviewing (MI) with an average of 3 sessions, plus provision of 14 days of free nicotine replacement therapy (NRT) if appropriate, and Quitline referral at the end of MI participation. Control participants were referred to the Quitline. Our primary outcomes were: 1) increase in smoke-free home rules, 2) change in child's cotinine from baseline to 1 year, and 3) parental smoking cessation at 1 year. We used an intention-to-treat analysis; data was analyzed with SAS v9.4 using Chi-square and t-tests for bivariable data, and multivariable logistic and linear regression.

Results: Of 1989 eligible families approached, 263 enrolled in the study (13%); 149 families had follow-up data at 12 months (57%). There were no significant differences between intervention and control groups in demographics or exposures (Table 1). Overall, 25% of the intervention group parents reported being quit at 12 months, compared to 15% in the control group, however this was not significant. In a model adjusted for potential confounders, compared to control families the intervention group had no difference in report of smoke free homes, a similar increase in cotinine levels, and a trend towards more parents having quit (Table 3).

Conclusion(s): A smoking cessation intervention was successfully delivered to parents of hospitalized children, resulting in a 25% quit rate at 12 months. Hospitals have an opportunity to provide resources to help parents quit smoking but more efficient and effective engagement strategies still need to be developed.

Table 1: Baseline demographic characteristics for control and intervention groups

Variables	Total (n=252)	Control (n=130)	Intervention (n=122)	P-value
Child's Gender				
Male	145 (58)	79 (61)	66 (54)	0.28
Female	107 (42)	51 (39)	56 (46)	
Age range of child				
Infants 0-1 yrs	72 (29)	34 (26)	38 (31)	0.72
Toddlers 1-2 yrs	54 (21)	31 (24)	23 (19)	
Preschool 3-4 yrs	27 (11)	15 (12)	12 (10)	
Grade school 5-12 yrs	76 (30)	40 (31)	36 (30)	
Teens 13+	23 (9)	10 (8)	13 (11)	
Race of child				
White	136 (54)	70 (54)	66 (54)	0.26
Black or African American	28 (11)	10 (8)	18 (15)	
Other	23 (9)	12 (9)	11 (9)	
Multiracial	65 (26)	38 (29)	27 (22)	
Ethnicity of Child				
Not Hispanic/Latino	158 (63)	78 (60)	80 (66)	0.35
Hispanic/Latino	92 (37)	51 (40)	41 (34)	
Subject's Relationship to Child				
Mother	170 (69)	86 (68)	84 (69)	0.77
Father	78 (31)	41 (32)	37 (31)	
Household income				
Less than $20,000	78 (34)	42 (36)	36 (33)	0.81
$20,001-$50,000	96 (42)	50 (42)	46 (42)	
More than $50,000	54 (24)	26 (22)	28 (25)	
Parent education				
Some high school or less	39 (16)	17 (13)	22 (18)	0.45
Grade 12 or GED (high school graduate)	64 (26)	37 (29)	27 (23)	
College 1 year to 3 years (some college)	119 (48)	63 (49)	56 (47)	
College 4 years or more (college graduate)	25 (10)	11 (9)	14 (12)	

Table 2: Baseline characteristics for control and intervention groups

Variables	Total (n=252)	Control (n=130)	Intervention (n=122)	P-value
Relationship status				
Married or member of a couple	154 (62)	80 (62)	74 (61)	0.77
Single (never been married)	62 (25)	30 (23)	32 (26)	
Divorced, widowed, separated	34 (14)	19 (15)	15 (12)	
Home ownership				
Own home	49 (21)	22 (19)	27 (24)	0.40
Rent home	180 (79)	93 (81)	87 (76)	
Housing type				
Stand-alone housing	151 (61)	76 (60)	75 (63)	0.67
Attached housing	96 (39)	51 (40)	45 (38)	
Government assistance for housing				
No	208 (85)	106 (83)	102 (86)	0.43
Yes	38 (15)	22 (17)	16 (14)	
Categorical hours child is out of the house				
0-10 hours	95 (45)	48 (43)	47 (47)	0.49
11-40 hours	76 (36)	44 (39)	32 (32)	
40+ hours	42 (20)	20 (18)	22 (22)	
Season of enrollment				
Spring(Mar-May)	71 (28)	37 (28)	34 (28)	0.92
Summer(Jun-Aug)	41 (16)	23 (18)	18 (15)	
Fall(Sep-Nov)	59 (23)	29 (22)	30 (25)	
Winter(Dec-Feb)	81 (32)	41 (32)	40 (33)	
Time to urine collection				
<=24 hours	38 (17)	18 (16)	20 (19)	0.54
>24 hours	180 (83)	95 (84)	85 (81)	
Parent's Age				
MEAN (STD)	32.0 (7.4)	32.2 (7.6)	31.8 (7.3)	0.69

Table 3: Bivariate comparison on outcomes measures for the control and intervention groups					
Time	**Outcome**	**Total n (%)**	**Control n (%)**	**Intervention n (%)**	**P-value**
Baseline		**n =252**	**n =130**	**n =122**	
	Please tell me which best describes how cigarette smoking is handled in your home.				
	No one is allowed to smoke anywhere	165 (68)	79 (64)	86 (73)	0.13
	Smoking is permitted in some places/anywhere	77 (32)	45 (36)	32 (27)	
	Missing	10	6	4	
	Urinary Cotinine (n=214)				
	Geometric Mean (95%CI)	0.9 (0.8,1.1)	1.0 (0.8,1.3)	0.9 (0.7,1.2)	0.70
12 month		**n =149**	**n =75**	**n =74**	
	Please tell me which best describes how cigarette smoking is handled in your home.				
	No one is allowed to smoke anywhere	109 (74)	54 (73)	55 (75)	0.74
	Smoking is permitted in some places/anywhere	38 (26)	20 (27)	18 (25)	
	Missing	2	1	1	
	Urinary Cotinine (n=106)				
	Geometric Mean (95%CI)	1.5 (1.1,2.1)	1.6 (1.0,2.7)	1.4 (0.8,2.3)	0.57
	Do you consider yourself to now be quit?				
	No	112 (80)	58 (85)	54 (75)	0.13
	Yes	28 (20)	10 (15)	18 (25)	
	Missing	9	7	2	

Table 4: Multivariate regression analysis on outcomes measures						
	Longitudinal Logistic regression for home smoking ban		**Longitudinal Linear regression for log cotinine***		**Logistic regression for parent report quit at 12 months**	
Predictor	**OR (95% CI)**	**Pvalue**	**Geometric Mean Ratio (95% CI)**	**Pvalue**	**OR (95% CI)**	**Pvalue**
Randomization: Iyes vs Control	1.16 (.601,2.23)	0.6595	.693 (412,1.16)	0.1686	1.93 (820,4.56)	0.2356
Time: 12 mo vs baseline	1.35 (646,2.82)	0.4249	1.63 (1.04,2.54)	**0.0350**		
Time*randomization	.962 (328,2.82)	0.9435	1.55 (780,3.09)	0.2129		
Other covariates in model	receiving government assistance for housing, car rules, allowing child to ride in car of smoker, and smoking in home in last 3 months		time spent outside home, number of smokers in home exposed in last 24 hours, receiving government assistance for housing, car rules, allowing child to ride in car of smoker, smoking in home in last 3 months, number of cigarettes smoked per day, home owner, and attached/detached housing		car rules and parent education	
			*Excluding 5 subjects with extreme differences from baseline			

IMAGE CAPTION: