

# Outcomes of Pediatric Respiratory Rapid Response Patients Admitted to Varying Subspecialties

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## BACKGROUND

Rapid Response (RR) systems have reduced cardiopulmonary arrest (CPA) and mortality in both pediatric and adult patients. Early identification of clinical decompensation outside of the ICU and appropriate triage of these patients leads to higher likelihood of survival. However, CPA and mortality remain uncommon events in pediatrics, resulting in the need for other outcome measures in this population, such as Critical Deterioration Events.

Within pediatric RR, respiratory symptoms account for the majority of RR triggers. Mortality after RR was higher for those with a respiratory trigger in adult studies.

## PURPOSE

To describe the characteristics and outcomes of pediatric patients with a respiratory trigger during Rapid Response Events (Resp-RR), with preliminary data focusing on patient type, as defined by the subspecialty service to which the patient is admitted.

## METHODS

- Retrospective, observational study
- Single pediatric, tertiary-care, academic hospital system with Central Campus and two Satellite Campuses
- Preliminary data focused on one year
- Critical Deterioration Events defined as need for noninvasive ventilation, mechanical ventilation, or vasoactive support within twelve hours of RR<sup>3</sup>
- Complex Chronic Conditions defined as “any patient with a medical condition that can be reasonably expected to last at least twelve months (unless death intervenes) and to involve either several different organ systems or one organ system severely enough to require specialty pediatric care and probably some period of hospitalization in a tertiary care center”<sup>4</sup>

	All Resp-RR (N=681)	General Pediatrics (N=394)	Pulmonology (N=52)	Cardiology (N=63)	Hematology-Oncology (N=72)	Other Subspecialties (N=46)	Surgery (N=54)
<b>Patient and RR characteristics</b>							
Complex Chronic Conditions, N(%)	374 (55)	<b>130 (33), p&lt;0.01*</b>	40 (77)	<b>57 (90), p&lt;0.01*</b>	<b>67 (93), p&lt;0.01*</b>	<b>39 (85), p&lt;0.01*</b>	34 (63)
ICU Stay 48-hr prior to RR, N(%)	43 (6)	20 (5)	6 (12)	3 (5)	4 (6)	2 (4)	<b>8 (15), p=0.01*</b>
Hours from Admission to RR, Median [IQR]	42 [17-152]	<b>27 [15-52], p&lt;0.01*</b>	48 [17-156]	<b>740 [130-2453], p&lt;0.01*</b>	<b>238 [75-710], p&lt;0.01*</b>	127 [53-409]	51 [22-143]
<b>Need for RR Interventions</b>							
Antibiotics started, N(%)	400 (59)	216 (55)	34 (65)	<b>19 (30), p&lt;0.01*</b>	<b>57 (79), p&lt;0.01*</b>	31 (67)	37 (69)
Fluid bolus given, N(%)	416 (61)	<b>281 (71), p&lt;0.01*</b>	31 (60)	<b>18 (29), p&lt;0.01*</b>	<b>33 (46), p=0.01*</b>	26 (57)	<b>24 (44), p=0.01*</b>
Chest X-ray at RR, N(%)	272 (40)	137 (35)	22 (42)	<b>34 (54), p=0.03*</b>	<b>40 (56), p&lt;0.01*</b>	12 (26)	26 (48)
<b>RR Outcomes</b>							
Transfer to ICU, N(%)	541 (79)	313 (79)	45 (87)	48 (76)	54 (75)	35 (76)	41 (76)
Critical Deterioration Event, N(%)	266 (39)	166 (42)	22 (42)	<b>13 (21), p&lt;0.01*</b>	33 (46)	12 (26)	19 (35)
Mortality, N(%)	39 (6)	<b>4 (1), p&lt;0.01*</b>	0	5 (8)	<b>26 (36), p&lt;0.01*</b>	4 (9)	0
<b>Need for ICU Therapies</b>							
Noninvasive ventilation, N(%)	280 (41)	<b>174 (44), p&lt;0.01*</b>	<b>29 (56), p&lt;0.01*</b>	17 (27)	<b>31 (43), p=0.02*</b>	11 (24)	17 (31)
Mechanical ventilation, N(%)	132 (19)	71 (18)	5 (4)	<b>18 (29), p&lt;0.01*</b>	<b>22 (31), p&lt;0.01*</b>	7 (15)	9 (17)
Vasoactives, N(%)	61 (9)	<b>15 (4), p=0.03*</b>	2 (4)	<b>18 (38), p&lt;0.01*</b>	<b>18 (33), p&lt;0.01*</b>	5 (14)	3 (7)

\*compared to All Resp-RR

RR= Rapid Response, Resp-RR= Rapid Response with a Respiratory trigger, N(%)= Number(Percentage), ICU= Intensive Care Unit, IQR= Interquartile Range

## RESULTS

- Of 1158 RR events, 681 (59%) RR in 571 patients were due to respiratory trigger (Resp-RR)
- Among Resp-RR, median age 1.5 years (IQR 0.4-6.6), with no significant difference between subspecialties
- Patient admitted to General Pediatrics was more likely to have viral pathogen: 138 (35%), p<0.01\*
- No difference in identification of bacterial pathogen
- No difference in ICU length of stay
- All therapy needs higher in Hematology-Oncology cohort, including need for HFOV and CRRT
- Need for ECMO limited to 1 General Pediatrics and 1 Cardiology patient
- Acute Respiratory Compromise (ARC) and CPA are rare events: 26 (4%) ARC and 1 CPA, with no statistical difference between groups

## CONCLUSIONS

- Resp-RR in patients admitted to General Pediatrics are more likely to have viral etiology, without a complex chronic condition, lower mortality, but may require noninvasive ventilation
- All therapy needs and mortality were higher for Hematology-Oncology patients
- Identification of therapy needs based on patient type may help prognosticate at RR and streamline resource allocation
- Future directions include study expansion to two years, analysis of granular respiratory support escalation, and subgroup analysis

## REFERENCES

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