

The Respiratory Therapist

Tales of Everyday Heroism

DISCLOSURE

- Senior Clinical Consultant for Mechanical Ventilation and NIV
- All clinical stories were shared with me by the participants

This lecture is dedicated to **YOU!**



Let's begin with a sad tale...

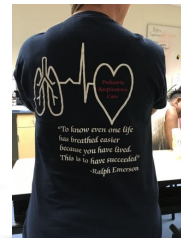
Give Up



Try



Let's begin with a sad tale...



Jake, Joe, and MAS



Severe MAS

- "Jake took his first poo and first breath at about the same time."
- Inflammation
- Ball valving and gas trapping
- Pneumothoraces
- Impeded hemodynamics
- PPHN

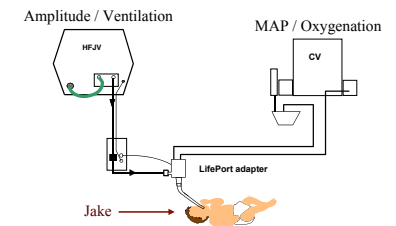


Severe MAS

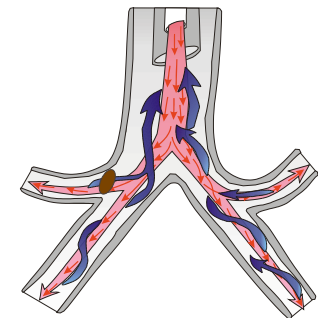
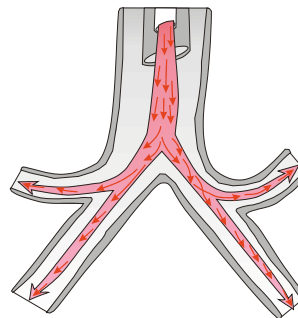
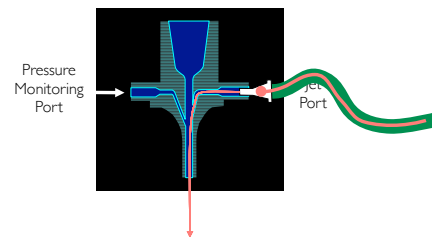
- Jake was failing CMV
- Jake was in big trouble
- Joe had an idea



HFJV in tandem with CV



Life Port Adapter





From: Ginny Tumbin
Sent: Monday, August 16, 2009 9:32 AM
To: Don Richards
Subject: Jet Ventilator

Hello,
My son, Jesse
He was born
on a ventilator
At that time
stage. I did
that it did.
At this point
of college.
Thank you,
Ginny Tumbin

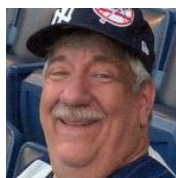


until 7/87
care unit
mental
retained
last year

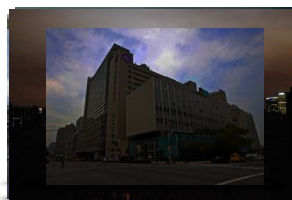
Respiratory Hero



Hurricane Sandy Richie's RTs



Hurricane Sandy



NYU-Bellevue Medical Center

Backup generators on top floor went down

Lost elevators

Human "bucket brigade" carried fuel up to 14th floor.

Fuel source for generators was in the basement under 8 feet of water.

Backup generators could no longer be fueled.

And... toilets no longer functioned.



NYU-Bellevue Medical Center

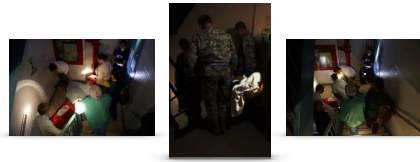
Hospital closed, and 600 patients had to be evacuated

- 20 NICU babies
- 5-6 on ventilators



NYU-Bellevue Medical Center

Vent patients were especially labor intensive to move; RTs needed help.
National Guard, EMTs, RNs, Bellevue MDs all chipped in.
Large flexible sheets of plastic with handles were used to carry patients.
A portable ventilator for each patient (RTs), along with I:Vs, etc. (RNs)
Flashlights were used when power went out.



NYU-Bellevue Medical Center

Emergency services from NYC and FEMA really came through:

- Materials Management: "Just tell us what you need."
- RTs: "We're running out of backup H cylinders and regulators."
- Within a couple of hours, a truck pulled up with cylinders, regulators, etc.
- "The national guard asked me where to bring the cylinders, and they hand carried them up 8 and 10 flights to the ICUs"

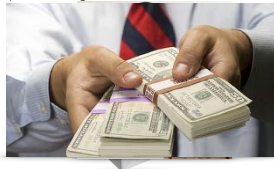


NYU-Bellevue Medical Center

Forays by RTs who were supposed to be resting to secure food and drink
Nobody thought only of themselves

Managers laid out their own money to insure staff had food and drink beyond what hospital could provide

One RT whose family owned a Chinese takeout restaurant in Brooklyn had her dad prepare and bring food for the staff.

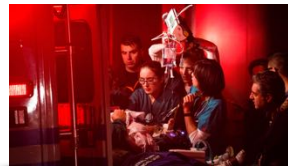


NYU-Bellevue Medical Center

RTs made sure all ventilated patients were managed properly and transitioned smoothly to emergency vehicles.

"We rediscovered the value of maintaining paper charting for backup."

Not a single patient went without ventilation or oxygen!



Respiratory Heroes



Titanic Problem in Florida



Case History

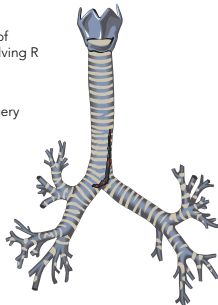
A 7-year-old previously healthy 25 kg girl, at a movie theater, experienced a severe crush injury when a large concrete pillar fell on her chest while she was swinging on a chain attached to the pillar.



Diagnosis

- Lacerated Liver
- Bilateral Pneumothoraces
- Subcutaneous Emphysema
- Tracheal Tear

- Intraoperatively: large tear of membranous trachea involving R and L mainstem bronchi.
- Prolonged and difficult surgery



Mechanical Ventilation

- Ventilation extremely difficult both intra- and post-operatively
- Extremely poor compliance vs. pulmonary airleaks
- HFOV (Sensormedics 3100)
 - 4-6 Hz, 20-70 Amplitude
- failed with $PCO_2 = 285$ and $pH = 6.65$

Mechanical Ventilation

- Other modes attempted with Siemens Servo 300 C
- PRVC: $V_T < 10$ cc/kg, PEEP = 5, Rate = 25-35
Result: PIP > 60
- Pressure Control: PIP = 35-40, Rates up to 140
Result: $V_T \sim 25$ cc



Dr. Joe LaSpada
Peds Intensivist

IN EXTREMIS!

- pH from 6.80 - 6.65
- PCO₂ from 195 - 285 mmHg
- More frequent desaturation
- Hemodynamic instability: fluid resuscitation and dopamine 20 mm/kg/min
- ECMO . . . too unstable to transport

HFJV

Settings

| | | |
|------------|-----|------|
| Rate: | 420 | 240 |
| PIP: | 50 | 40 |
| CV Rate: | 30 | CPAP |
| PEEP/CPAP: | 10 | 14 |

HFJV Response

- 1h 15 min:
pH increased to 7.21
PaCO₂ decreased to 72 mmHg
- 2h 10 min:
pH increased to 7.52
PaCO₂ decreased to 26 mmHg

Recovery

- Day 6: changed to conventional ventilation
- Day 8: repeat bronchoscopy revealed good healing of tear without granuloma or tracheitis
- Day 10: Chest tubes out
- Day 11: Extubated
- Day 14: Discharged home

Respiratory Heroes



Rob, Wendy & the Toronto Ice Storm



Toronto Ice Storm



NIC
YOU ARE OUTSTANDING R.T.s. I
TRUST YOU TO DO WHAT IS
NECESSARY.



4 RRTs
including Rob and Wendy



Seasoned NNP
and RNs



Junior Fellow



- Power goes out
- Generators kicked on, all is well
- Generators ran out of fuel, go out. NO POWER
- How long will power be out?
- 6 babies on ventilators, NIV
- Bagging
- Power not coming on
- Get me more vents, with full backup batteries

Rob



- Staff was asked to transport
- Senior RRTs have non-critical transport
- Rob was asked to transport
- Rob was asked to transport
- Rob was asked to transport

Wendy



- 26-weeker born as power was being restored
- EMS used Air Trans van, designed for non-critical transport
- Wendy bagged during transport
- "I talked to the baby the whole way."

Marilyn and Brian Hyndman



- Marilyn Hyndman gets call: "Come in!"
- "It's 4 in the morning!"
- "We've lost total power and are evacuating!"
- Marilyn, nudging semi-conscious Brian: "You have to drive me to work!"



- They drive Brian's 4x4 truck through pitch black darkness in the middle of the storm, around fallen trees, and through barely passable streets
- Arrive an hour later.
- Brian helped Rob carry vent upstairs for 26 weeker just born

Every baby survived and thrived!

Respiratory Heroes



Respiratory Heroes

Mark Zarembo

Kept NICU baby with ↓ PaO₂ and ↑ PaCO₂ off ECMO by convincing MDs to try a new ventilator.

Duane Wong

Used the Jet to successfully ventilate 17-year-old when ET tube cuff failed during spine surgery.



Chef Tojo

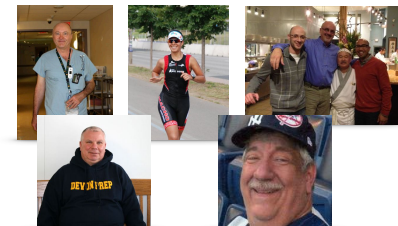


Tojo also inspired me to lose 28 pounds



Moral:

Every day, RTs are heroic



What do all of these stories have in common?

They are not supported by a
Randomized Controlled Trial nor Meta-analytics

Randomized Controlled Trials

Without evidence-based research, modern medicine
wouldn't exist.



I received an e-mail a few days ago from a colleague at the World Health Organization (WHO), attached to which was a British Medical Journal paper whose title, "Parachute use to prevent death and major trauma related to gravitational challenge: Systematic review of [randomized] controlled trials," peaked my interest—it for no other reason than the subject matter falls well outside of my immediate research interest.

Once I read the article—and in light of continuing debate within the HIV research community around the need (or lack thereof) for evidence based medicine to guide the expansion of [antiretroviral therapy](#) to low-income countries—I began to target to appreciate my colleague's underlying message regarding the "science of medicine" versus the "practice of medicine," and how a balance must be established between these requiring a [cautious approach to interpreting evidence](#) using [evidence-based medicine](#) and prior extreme attitudes in clinical decision making.

Reprinted here is the original British Medical Journal paper, which I hope contributes to the ongoing dialogue. While we can all certainly remain proponents of evidence based medicine, might we contemplate an observational data-based (aka "parachute-based") reality test in the face of a scourge that is decimating countless men, women, and children in the developing world? ■

—Joel M. Zujewski, MSc, PhD
Interim Managing Editor

Parachute use to prevent death and major trauma related to gravitational challenge: Systematic review of [randomized] controlled trials

Gordon CS Smith, MD, PhD,¹ and Jill P. Pell, MD²

¹Department of Obstetrics and Gynaecology, Cambridge University, Cambridge, UK; ²Department of Public Health, Greater Glasgow NHS Board, Glasgow, Scotland

Introduction

The parachute is used in recreational, voluntary sector, and military settings to reduce the risk of (orthopaedic), head, and soft tissue injury after gravitational challenge, typically in the context of jumping from an aircraft. The perception that parachutes are a successful intervention is based largely on anecdotal evidence. Observational data have shown that their use is associated with morbidity and mortality, due to both failure of the intervention.¹

Micro-analysis: Our statistical approach was to assess outcomes in parachute and control groups by odds ratios and quantified the precision of estimates by 95 percent confidence intervals. We chose the Mantel-Haenszel test to assess heterogeneity, and sensitivity and subgroup analyses and fixed effects weighted regression techniques to explore causes of heterogeneity. We selected a funnel plot to assess publication bias visually and Egger's and Begg's tests to test it quantitatively. Data

Parachute vs. No Parachute



Objectives To determine whether parachutes are effective in preventing major trauma related to gravitational challenge.

Design Systematic review of randomized controlled trials.

Study selection Studies showing the effects of using a parachute vs. not using a parachute during free fall.

Main outcome measure Death or major trauma, defined as an ISS > 15.

Results "We were unable to identify any randomized controlled trials (RCTs) of parachute intervention. Lack of no-parachute groups."

Conclusions



- No RCTs of parachute use have been undertaken.
- The basis for parachute use is purely observational.
- Individuals who insist that all interventions need to be validated by a RCT need to come down to earth . . . with a bump.

*"While we can all certainly remain proponents of evidence based-medicine, might we contemplate an **observational data-based reality test** in the face of a scourge that is decimating countless patients?"*

- Editor

RCTs are INFINITELY Important

"RCTs **prove** the concept, but intuition **creates** the concept."

Royal Columbia Neonatologist

The Problems with Meta-Analytics

N

Doctors

"The more N, the better!"

"Evidence-Based Medicine"

Doctors

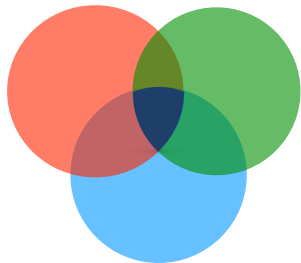
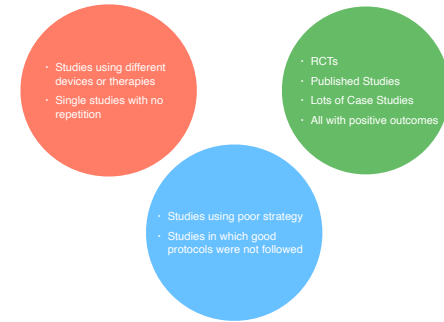
"There is no evidence-based medicine that your idea makes a difference . . ."

". . . according to a meta analysis."

"I do not generally like meta-analysis . . .
unless it supports my bias."

— Alex Rotta, MD

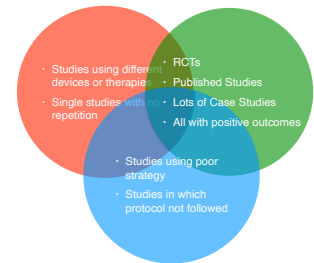
The Problem with Meta Analytics



Meta Analysis



"No evidence that this makes a difference."



The intervention DOES make a difference!

- RCTs
- Published Studies
- Lots of Case Studies
- All with positive outcomes

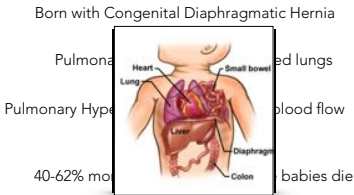
Now . . . the last story

Hudson, Hilerie, and the N of 1



Hudson Hillberry

Hudson Hillberry



Hudson Hillberry

Smaller regional hospital clinicians consulted with larger metropolitan teaching hospital clinicians

"We have a severe CDH baby."
"Tell us about him."

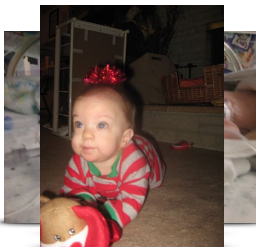
"What do you suggest?"
"Throw in the towel . . . some babies die."

"You know us, Evan.
We never throw in the towel...
unless we've run out of hope"

- Hilerie King, RRT



Hudson Hillberry



Respiratory Hero

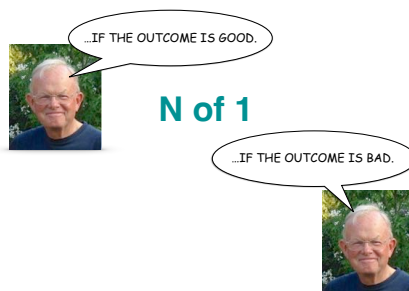


Hudson Hillberry

To his parents, Hudson is all the evidence they need
that RT intuition works

To us, Hudson is all the evidence we need to know
that RTs can make a difference . . .

N of 1 can be powerful



Educate yourself
to become the best RT you can be!



Dr. Colin Morley

The Science of Medicine

Evidence-Based Interventions
vs.
Clinical Experience and Intuition

The Practice of Medicine

Summary



Mona Hanna-Attish, MD



Marc Edwards, PhD



“Stand for something good.”

“Don’t give up.”

“Always do your best work.”

— Kathleen Richards

Thank

You

