

# Recognize & Rescue of the Injured Patient



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Ellen M. Harvey DNP, RN, ACNS-BC, CCRN, TCRN, FCCM

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# Disclosure statement

The presenter has no conflict of interest relative to this educational activity to disclose.



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**Perfect Our Spidey Senses**

# Objectives:

1. Discuss risk factors for failure to rescue and unplanned ICU admissions in the injured patient.
2. Identify ten major early warning signs suggesting clinical decline in the injured patient.
3. Describe essential strategies to use in practice to prevent failure to rescue of the injured patient.

# Failure to Rescue (FTR)

- A patient death or adverse outcomes resulting from unrecognized complications
- Identified by Joint Commission, AHRQ, ... as a
  - **Nurse Sensitive Indicator** – RNs have a direct impact on this quality indicator
- FTR & the Injured patient a complex metric

Atkins, S., & Nygaard, J. (2004). Relationship between patient mortality and nurses' level of education. *JAMA*, 291(11), 1320-1323.

Holena, D. N., Kaufman, E. J., Delgado, M. K., Wiebe, D. J., Carr, B. G., Christie, J. D., & Reilly, P. M. (2017). A metric of our own: Failure to rescue after trauma. *The journal of trauma and acute care surgery*, 83(4), 698.

Massey, D., Chaboyer, W. & Anderson, V. (2009). What factors influence suboptimal ward care in the acutely ill ward patient? *Intensive and critical care nursing*, 25(4), 169-180.

Mushta, J., L. Rush, K., & Andersen, E. (2018, January). Failure to rescue as a nurse-sensitive indicator. In *Nursing forum* (Vol. 53, No. 1, pp. 84-92).

Portuondo, J. I., Shah, S. R., Singh, H., & Massarweh, N. N. (2019). Failure to rescue as a surgical quality indicator: current concepts and future directions for improving surgical outcomes. *Anesthesiology*, 131(2), 426-437.

Rao, A. D., Kumar, A., & McHugh, M. (2017). Better nurse autonomy decreases the odds of 30-day mortality and failure to rescue. *Journal of nursing scholarship*, 49(1), 73-79.

Shoemaker-Hunt, S., Hall, K., & Hoffman, L. (2020). Advancing Patient Safety: Reviews From the Agency for Healthcare Research and Quality's Making Healthcare Safer III Report. *Journal of Patient Safety*, 16(3 1 Suppl), S1.

# Failure to Rescue – SO What?

## What about trauma?



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Franklin, C., & Mathew, J. (1994). Developing strategies to prevent in-hospital cardiac arrest: analyzing responses of physicians and nurses in the hours before the event. *Critical care medicine*, 22(2), 244-247.

Rubano, J. A., Vosswinkel, J. A., McCormack, J. E., Huang, E. C., Shapiro, M. J., & Jawa, R. S. (2016). Unplanned intensive care unit admission following trauma. *Journal of critical care*, 33, 174-179.

Schein RM, Hazday N, Pena M, et al. (1990). Clinical antecedents to in-hospital cardiopulmonary arrest. *Chest*. 98, 1388-1392.

## UNPLANNED ADMISSION TO ICU

### DESCRIPTION

Patients admitted to the ICU after initial transfer to the floor, and/or patients with an unplanned return to the ICU after initial ICU discharge.

### ELEMENT VALUES

1. Yes
2. No

### ADDITIONAL INFORMATION

- Must have occurred during the patient's initial stay at your hospital.
- EXCLUDE: Patients with a planned post-operative ICU stay.
- INCLUDE: Patients who required ICU care due to an event that occurred during surgery or in the PACU.

### DATA SOURCE HIERARCHY GUIDE

1. History & Physical
2. Physician's Notes
3. Progress Notes
4. Case Management/Social Services
5. Nursing Notes/Flow Sheet
6. Triage/Trauma Flow Sheet
7. Discharge Summary



[https://play.google.com/store/apps/details?id=com.coreapps.android.followme.tqip&hl=en\\_US&gl=US](https://play.google.com/store/apps/details?id=com.coreapps.android.followme.tqip&hl=en_US&gl=US)

Frank, B., Lewis, A., Magnotta, J., Guzzi, C., Clark, D. & Mitchell, J. (2020). Keep calm and stay out of the ICU: A comprehensive approach to reducing unplanned ICU admissions. Retrieved from <https://bulletin.facs.org/2020/04/keep-calm-and-stay-out-of-the-icu-a-comprehensive-approach-to-reducing-unplanned-icu-admissions/>

# **Rescue Means to Save**



# Top 3 Reasons for Failure to Rescue

“Simply stated, information is helpful only if it is correct, understood and acted on quickly and appropriately.”

Kramer, AA, Sebat, F & Lissauer, M.,  
2017, p.S71.

This is an unprecedented time. It is t

≡ ME  
CA



er Subbe ✓



# **RECOGNIZING**

Trauma is a surgical disease.  
It's all about the anatomy.



**ANTICIPATE WHAT WILL  
PERCOLATE!**

Mateusz  
Atroszko©123rf.com

The whole person, then and now...

Responses to injury vary

Injuries **WILL** get worse before they get better



# Don't let sleeping dogs lie...

Chung, J. J., Earl-Royal, E. C., Delgado, M., Pascual, J. L., Reilly, P. M., Wiebe, D. J., & Holena, D. N. (2017). Where we fail: location and timing of failure to rescue in trauma. *The American Surgeon*, 83(3), 250-256.

Tisherman, S. A., Baric, P., Bokhari, F., Bonadies, J., Daley, B., Diebel, L., ... & Schreiber, M. (2004). Clinical practice guideline: endpoints of resuscitation. *Journal of Trauma and Acute Care Surgery*, 57(4), 898-912.



**Foot warm + pulse = things are good**  
**Foot warm + pulse + making urine =**  
**things are great**

# Be Systematic



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## The 5 Rights of Clinical Reasoning

1. Right patient
2. Right cues
3. Right time
4. Right action
5. Right reason

# STEP#1 Right patient is the at-risk patient

## The 4 Bees

- Blood
- Bugs
- Brains
- BOLO (Bee on the look out!)

Chung, J. J., Earl-Royal, E. C., Delgado, M., Pascual, J. L., Reilly, P. M., Wiebe, D. J., & Holena, D. N. (2017). Where we fail: location and timing of failure to rescue in trauma. *The American Surgeon*, 83(3), 250-256.

Churpek, M. M., Edelson, D. P., Lee, J. Y., Carey, K., Snyder, A., & American Heart Association's Get With The Guidelines-Resuscitation Investigators. (2017). Association Between Survival and Time of Day for Rapid Response Team Calls in a National Registry. *Critical Care Medicine*.

Earl-Royal, E., Kaufman, E. J., Hsu, J. Y., Wiebe, D. J., Reilly, P. M., & Holena, D. N. (2016). Age and preexisting conditions as risk factors for severe adverse events and failure to rescue after injury. *Journal of surgical research*, 205(2), 368-377.

Kaufman, E. J., Hatchimonji, J. S., Ma, L. W., Passman, J., & Holena, D. N. (2020). Complications and failure to rescue after abdominal surgery for trauma in obese patients. *Journal of Surgical Research*, 251, 211-219.

Fakhry, S. M., Leon, S., Derderian, C., Al Harakeh, H., & Ferguson, P. L. (2013). ICU bounce back in trauma patients: an analysis of unplanned returns to the intensive care unit. *The journal of trauma and acute care surgery*, 74(6), 1528.

Hatchimonji, J. S., Kaufman, E. J., Sharoky, C. E., Ma, L., Whitlock, A. E. G., & Holena, D. N. (2019). Failure to rescue in surgical patients: a review for acute care surgeons. *The journal of trauma and acute care surgery*, 87(3), 699.

Joseph, B., Phelan, H., Hassan, A., Jokar, T. O., O'Keefe, T., Azim, A., ... & Rhee, P. (2016). The impact of frailty on failure-to-rescue in geriatric trauma patients: a prospective study. *Journal of trauma and acute care surgery*, 81(6), 1150-1155.

Mok, W. Q., Wang, W., & Liaw, S. Y. (2015). Vital signs monitoring to detect patient deterioration: An integrative literature review. *International Journal of Nursing Practice*, 21, 91-98.

Sharoky, C. E., Martin, N. D., Smith, B. P., Pascual, J. L., Kaplan, L. J., Reilly, P. M., & Holena, D. N. (2019). The location and timing of failure-to-rescue events across a statewide trauma system. *Journal of surgical research*, 235, 529-535.

Stonko, D. P., Etehill, E. W., Giuliano, K. A., DiBrito, S. R., Eisensohn, D., Heinrichs, T., ... & Kent, A. J. (2021). Failure to rescue in geriatric trauma: the impact of any complication increases with age and injury severity in elderly trauma patients. *The American Surgeon*, 87(11), 1760-1765.

Twigg, D. E., Whitehead, L., Doleman, G., & El-Zaemey, S. (2021). The impact of nurse staffing methodologies on nurse and patient outcomes: A systematic review. *Journal of Advanced Nursing*, 77(12), 4599-4611.



# What about children?

- Lower rates of Failure to Rescue
- <24 hours of admit & transfer
- Parents know

[http://globedia.com/imagenes/noticias/2013/7/12/difteria-en-ninos\\_1\\_1765663.jpg](http://globedia.com/imagenes/noticias/2013/7/12/difteria-en-ninos_1_1765663.jpg)

Ma, L. W., Hatchimonji, J. S., Kaufman, E. J., Sharoky, C. E., Smith, B. P., & Holena, D. N. (2019). Failure to rescue as a center-level metric in pediatric trauma. *Surgery*, 165(6), 1116-1121.

Raymond, T. T., Bonafide, C. P., Praestgaard, A., Nadkarni, V. M., Berg, R. A., Parshuram, C. S., & Hunt, E. A. (2016). Pediatric medical emergency team events and outcomes: a report of 3647 events from the American heart association's get with the guidelines-resuscitation registry. *Hospital pediatrics*, 6(2), 57-64.

Rosenfeld, E. H., Zhang, W., Johnson, B., Shah, S. R., Vogel, A. M., & Naik-Mathuria, B. (2019). The value of failure to rescue in determining hospital quality for pediatric trauma. *Journal of Trauma and Acute Care Surgery*, 87(4), 794-799.

# **STEP #2 Right Cues –The Red Flags**

**Compensation to maintain perfusion**

***AND/OR***

**Signs the compensation is failing**





# Vital Means Life

- Reality check:  
**VITAL SIGNS ARE VITAL** but only if they are?

**Accurate!**



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■ **Reality Check:** What is the earliest vital sign to change & only vital sign we don't count?

– **Respiratory rate!**

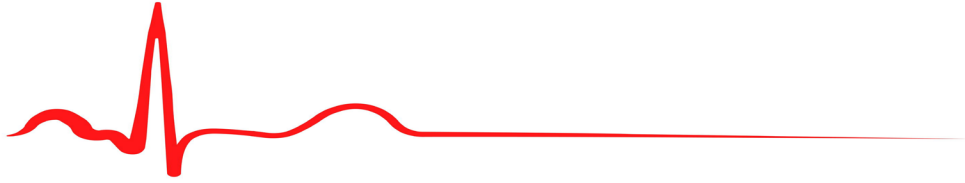
Garvey, P. K. (2015). Failure to rescue: the nurse's impact. *MedSurg Nursing*, 24(3), 145.

Parkes, R. (2011). Rate of respiration: the forgotten vital sign. *Emergency Nurse*, 19(2).

Vincent, J. L., Einav, S., Pearse, R., Jaber, S., Kranke, P., Overdyk, F. J., ... & Hoelt, A. (2018). Improving detection of patient deterioration in the general hospital ward environment. *European journal of anaesthesiology*, 35(5), 325.

|             |            |             |            |
|-------------|------------|-------------|------------|
| Date / Time |            | Date / Time |            |
| Rm          |            | Rm          |            |
| Temp.       | 99.5       | Temp.       | 99.6       |
| Pulse       | 89         | Pulse       | 97         |
| Resp.       | 18         | Resp.       | 16         |
| B/P         | 142/83 107 | B/P         | 137/82 105 |
| O2 Sat      | 96         | O2 Sat      | 93         |
| Blood Sugar |            | Blood Sugar | 112        |
| I-          | 0-         | I-          | 0-         |
| Date / Time |            | Date / Time |            |
| Rm          |            | Rm          |            |
| Temp.       | 97.7       | Temp.       | 97.6       |
| Pulse       | 60         | Pulse       | 17         |
| Resp.       | 16         | Resp.       | 18         |
| B/P         | 105/52 73  | B/P         | 120/73 91  |
| O2 Sat      | 91         | O2 Sat      | 95         |
| Blood Sugar |            | Blood Sugar |            |
| I-          | 0-         | I-          | 0-         |

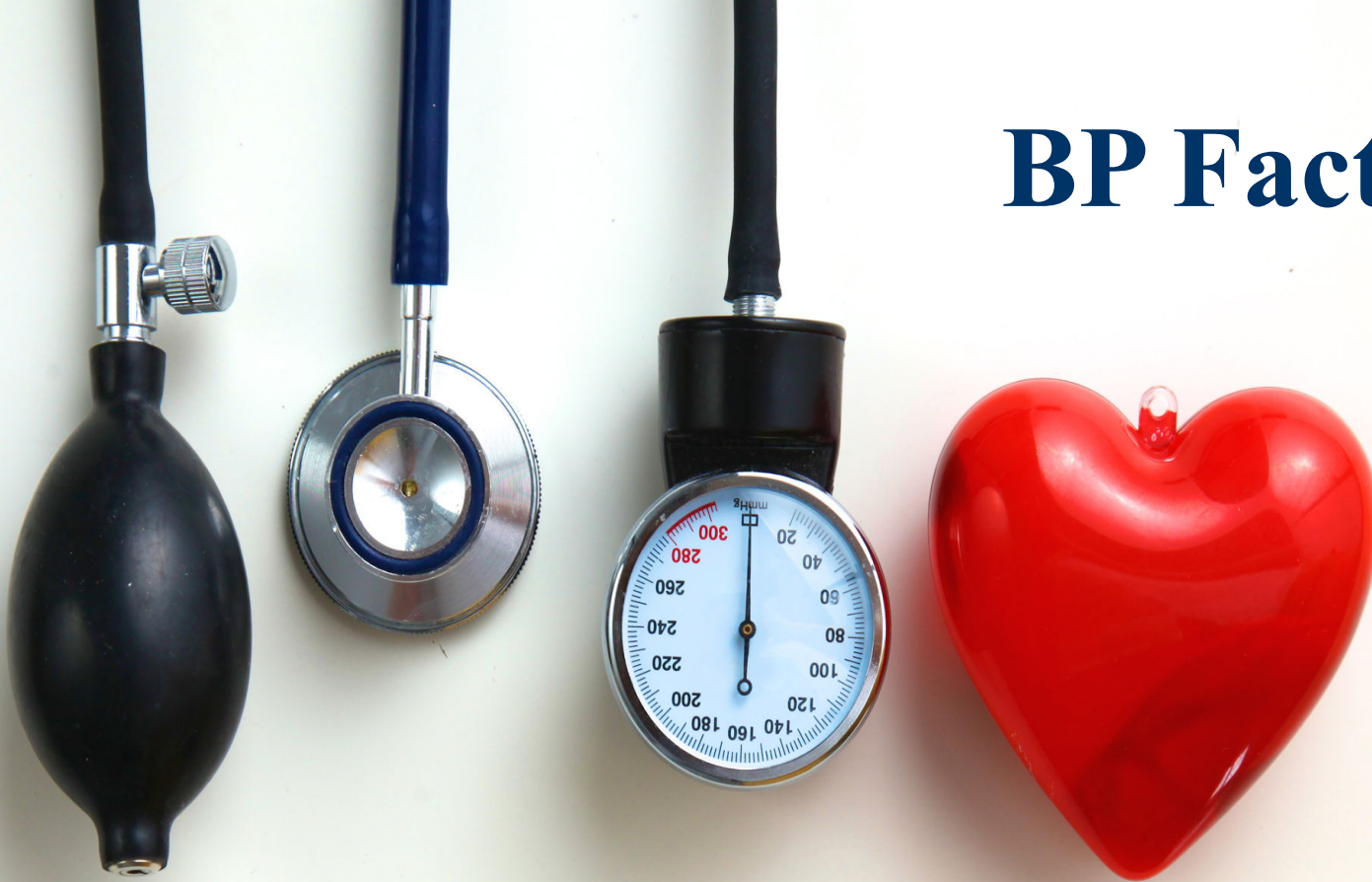
**Advocate for the Respiratory Rate!**



# Pulse Facts

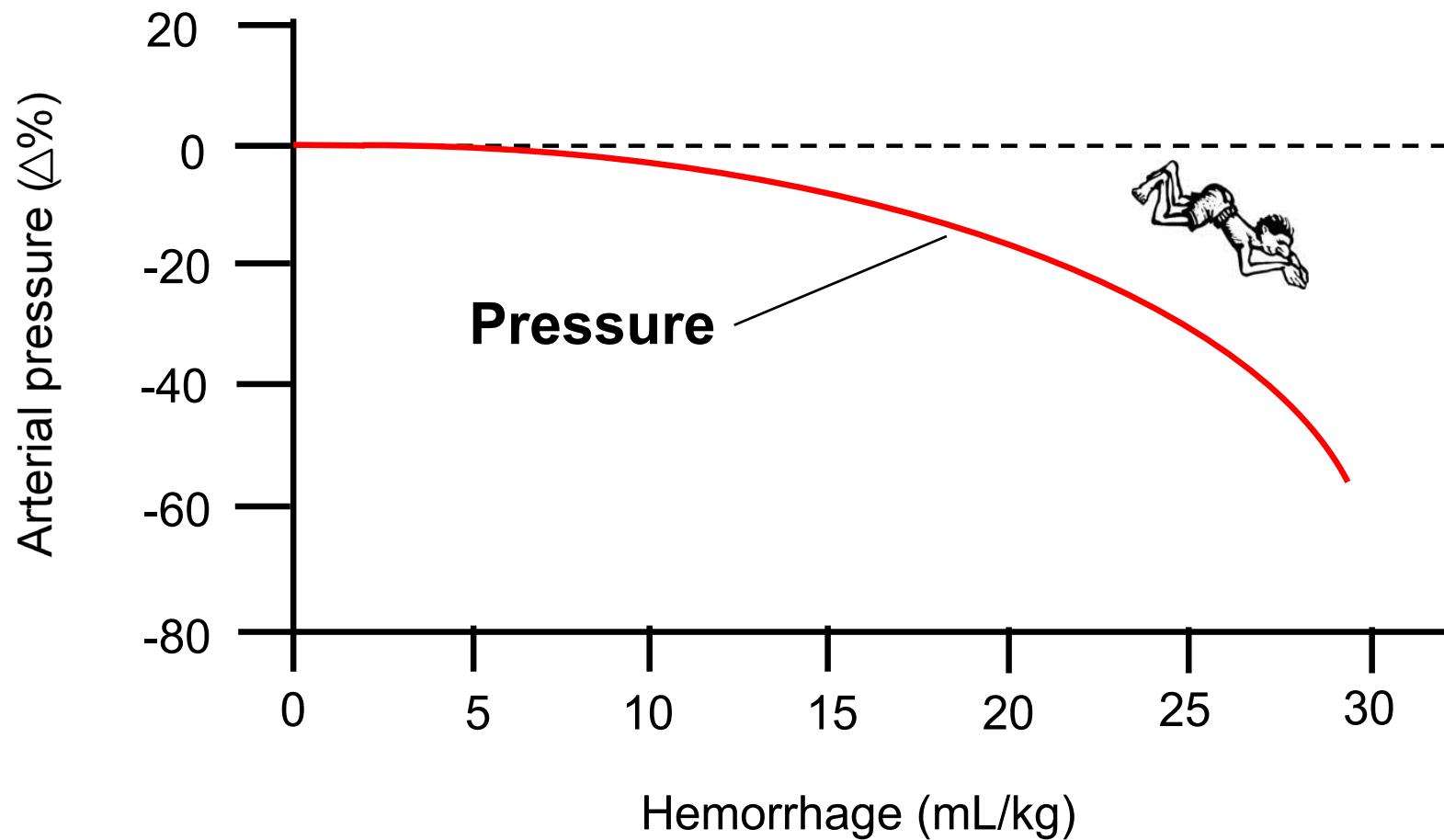
- **Not the first compensatory vital sign**
- **Tachycardia is EXPENSIVE– do not ignore**
- **Bradycardia think dysautonomia = Neuro**
- **Paradoxical bradycardia may occur in cases of massive blood loss**

# BP Facts



**Reality Check: Does normotensive shock exist?**

- **Absolutely!**
- SBP can be “normal” and a patient be in real trouble. Normotensive shock is associated with increased mortality





# Blood Pressure Measurement

## The Recycle

Button **IS NOT**

fixing our patient

Davis, J. W., Davis, I. C., Bennink, L. D., Bilello, J. F., Kaups, K. L., & Parks, S. N. (2003). Are automated blood pressure measurements accurate in trauma patients?. *Journal of Trauma and Acute Care Surgery*, 55(5), 860-863.

Sebat F., Lighthall G.K., Baldisseri, M.B., Wax, R.S., Henderson, S. & Shoffner, D.J. (2009). Education and case studies. In Sebat F, (Ed.), *Designing, Implementing, and Enhancing a Rapid Response System* (pp. 104-183). Mount Prospect, IL: Society of Critical Care Medicine.

Seamon, M. J., Feather, C., Smith, B. P., Kulp, H., Gaughan, J. P., & Goldberg, A. J. (2010). Just one drop: the significance of a single hypotensive blood pressure reading during trauma resuscitations. *Journal of Trauma and Acute Care Surgery*, 68(6), 1289-1295.

Series, W., Awards, E., Awards, B., & Join, A. A. C. N. (2016). Obtaining accurate noninvasive blood pressure measurements in adults <https://www.aacn.org/clinical-resources/practice-alerts/obtaining-accurate-noninvasive-blood-pressure-measurements-in-adults>.

# BP Facts

**Reality Check:** Do young (<3 y/o) pediatric patients need a blood pressure measurement?

- **Absolutely!** Not documented...
- Hypotension SBP < 70mm Hg + [2 x age] from 0 ~ 8years

# The Shock Index (SI)

- Trauma patients with SI >0.9 have higher likelihood of disposition to the ICU, OR, need for MTP, or death!
- SI  $\geq$  1 predictor of high lactate and mortality in sepsis.
- What is the Shock index?
  - Ratio of HR/SBP
- **Take away:**
  - **3 digit Heart Rate → BAD**
  - **2 digit Systolic Blood pressure → BAD**

Berger et al.(2013). (Shock index and early recognition of sepsis in the ED: Pilot study. *Western Journal of emergency medicine*, 14(2):168-172.

Cannon CM, et al. (2009). Utility of the shock index in predicting mortality in traumatically injured patients. *J Trauma*, 67(6), 1426-30. Mutschler et al. Critical Care Medicine, 2013, <http://ccforum.com/content/17/4/R172>

Caldwell, N. W., Suresh, M., Garcia-Choudary, T., & VanFosson, C. A. (2020). CE: trauma-related hemorrhagic shock: a clinical review. *AJN The American Journal of Nursing*, 120(9), 36-43

Day, D. L., Ng, K., Huang, J. B., Severino, R., & Hayashi, M. S. (2021). Comparison of Shock Index With the Assessment of Blood Consumption Score for Association With Massive Transfusion During Hemorrhage Control for Trauma. *Journal of Trauma Nursing | JTN*, 28(6), 341-349..

# Temperature Impacts Every Enzyme Function & Every Intervention Impacts Temperature



# Temperature Facts

## Nightshift gets the fevers

- Think atelectasis or infection, especially in post-op patients

Tatiana Korchemkina©123rf.com

# Signs of End Organ Hypoperfusion aka “Losing the Battle”



Salt



&

Everything  
nice

Sugar



***OK the Brain is MOST  
important so let's start there...***

# Level of Consciousness

- Subtle changes are **VERY** important and should be reported to the Provider
- High risk abnormal LOC progression
  - Anxiety >> confusion >> agitation >> delirium
  - Anxiety >> apathy >> stupor >> coma





# The Lost Art of Capillary Refill

- Fleming, S., Gill, P., Jones, C., Taylor, J. A., Van den Bruel, A., Heneghan, C., & Thompson, M. (2015). Validity and reliability of measurement of capillary refill time in children: a systematic review. *Archives of disease in childhood*, 100(3), 239-249.
- Jevon, P., & Gallier, H. (2020). How to measure capillary refill time in patients who are acutely ill. *Nurs Times*, 116(8), 29-30.
- Lara, B., Enberg, L., Ortega, M., Leon, P., Kripper, C., Aguilera, P., ... & Hernandez, G. (2017). Capillary refill time during fluid resuscitation in patients with sepsis-related hyperlactatemia at the emergency department is related to mortality. *PLoS One*, 12(11).
- McGuire D, Gotlib A, King J. Capillary Refill Time. [Updated 2021 Apr 22]. In: StatPearls [Internet]. Treasure Island (FL): StatPearls Publishing; 2022 Jan.
- Morocho, J. P., Martínez, A. F., Cevallos, M. M., Vasconez-Gonzalez, J., Ortiz-Prado, E., Barreto-Grimaldos, A., & Vélez-Páez, J. L. (2021). Prolonged Capillary Refilling as a Predictor of Mortality in Patients With Septic Shock. *Journal of Intensive Care Medicine*, 08850666211003507..
- Sansone, C. M., Prendin, F., Giordano, G., Casati, P., Destrebecq, A., & Terzoni, S. (2017). Relationship between capillary refill time at triage and abnormal clinical condition: a prospective study. *The open nursing journal*, 11, 84.

# Skin: Window to What is Inside

**PINK**

**PALE**

**BLUE**

**Hot/Cold**

**Dry/Wet**

# Pain: A Separate Lecture

- **Red Flags**
  - Acute Change
  - Uncontrolled



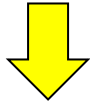


- Point tenderness and referred pain patterns
- Serial abdominal exams

# Mr. Pulse Oximeter



- Don't let him make a fool out of you!

- How much oxygen is it taking?

-  O2 sat &  FiO2 requirements = 
  - # Respiratory failure is the #1 cause of failure to rescue in hospitalized patients

Coates, M., Pillado, E., Kim, J., Vasak, R., Yule, A., & Kim, D. Y. (2017). Role of preventability in redefining failure to rescue among major trauma patients. *JAMA surgery*, 152(11), 1083-1084.

Scantling, D., Hatchimonji, J., Kaufman, E., Xiong, R., Yang, W., & Holena, D. N. (2021). Pulmonary complications in trauma: Another bellwether for failure to rescue?. *Surgery*, 169(2), 460-469.

Vincent, J. L., Einav, S., Pearse, R., Jaber, S., Kranke, P., Overdyk, F. J., ... & Hoeft, A. (2018). Improving detection of patient deterioration in the general hospital ward environment. *European journal of anaesthesiology*, 35(5), 325.



PEE is Liquid Gold

# Acute Metabolic Acidosis in hospitalized patients is a **KILLER**



- Corwin, G. S., Sexton, K. W., Beck, W. C., Taylor, J. R., Bhavaraju, A., Davis, B., ... & Robertson, R. D. (2020). Characterization of acidosis in trauma patient. *Journal of Emergencies, Trauma, and Shock*, 13(3), 213.
- Deane, M., Galvagno Jr, S. M., Moran, B., Stein, D. M., Scalea, T. M., & O'Connor, J. V. (2020). Shock, not blood pressure or shock index, determines the need for thoracic damage control following penetrating trauma. *Shock*, 54(1), 4-8.
- Gerecht, R. (2014). Trauma's lethal triad of hypothermia, acidosis & coagulopathy create a deadly cycle for trauma patients. *Jems*, 39(4), 56-60.

# Step #3 Right Time - It Matters

## Normal lactate:

- @24 hours mortality 3.9%
- @24-48 hours mortality 13.3%
- @48-96 hours mortality 42.5%
- Never normal 100% mortality



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# Step #4 Right Action

Alert-Communicate-Treat-

Need to Observe for

*Warnings* = **ACT NOW**

ABCDE...,ABCDE....



# Step #5 Right Reason

*“It’s obvious to me that we nurses  
faithfully use **why** as our guide”*

Christine Schulman MS, RN, CNS, CCRN-K  
Former President American Association of Critical  
Care Nurses



# Case Studies

**Is there problem?**

**Is the patient in a  
physiologic  
balancing act?**

# Case Study # 1



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**28 y/o MVC @ 45MPH;  
head on, + lap belt restraint**

- **Sternum & rib Fxs**
- **T-12 Vertebral body Fx**
- **+ belly ecchymosis**

**At risk for  
Failure to  
Rescue?**

# Case Study

## # 1

RR 26; HR 109;  
BP 98/78;  
Temp 98.6

**Vital signs  
compensation?**





dolgachov © 123rf.com

# Case Study

## # 1

**Vital sign  
compensation?  
YES**

- **RR 26 –Tachypneic blowing off acid**
- **HR 109 - Tachycardic - boost CO, pain?**
- **SBP 98 -**
  - **PP 20 - Vasoconstricted**
  - **MAP 85 – adequate for now**
  - **SI (109/98 = 1.1) – HR>SBP**
- **Temp 98.6 - normothermic**

# Case

## Study # 1

End organ  
dysfunction?  
**YES**

**Alert and oriented, back pain; not hungry, hypoactive bowel sounds, no distention; skin warm and dry; lungs clear, pulse oxi 98% on RA; peripheral pulse 1+; 200mL UO in 8 hours; WBC 15K**



# Case Study # 1

**Need  
Rescue?  
Suspect  
Shock?**



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# **ABSOLUTELY**

# Case Study # 2

**57 y/o male, fall 12 feet, multiple rib fxs; pulmonary contusions, Right tib/fib fx. “I just don’t feel as good today.”**

**At risk for  
Failure to  
Rescue?**





# Case Study # 2

**RR 23; HR  
98; BP  
134/62; Temp  
100.4**

**Vital sign  
compensation?**

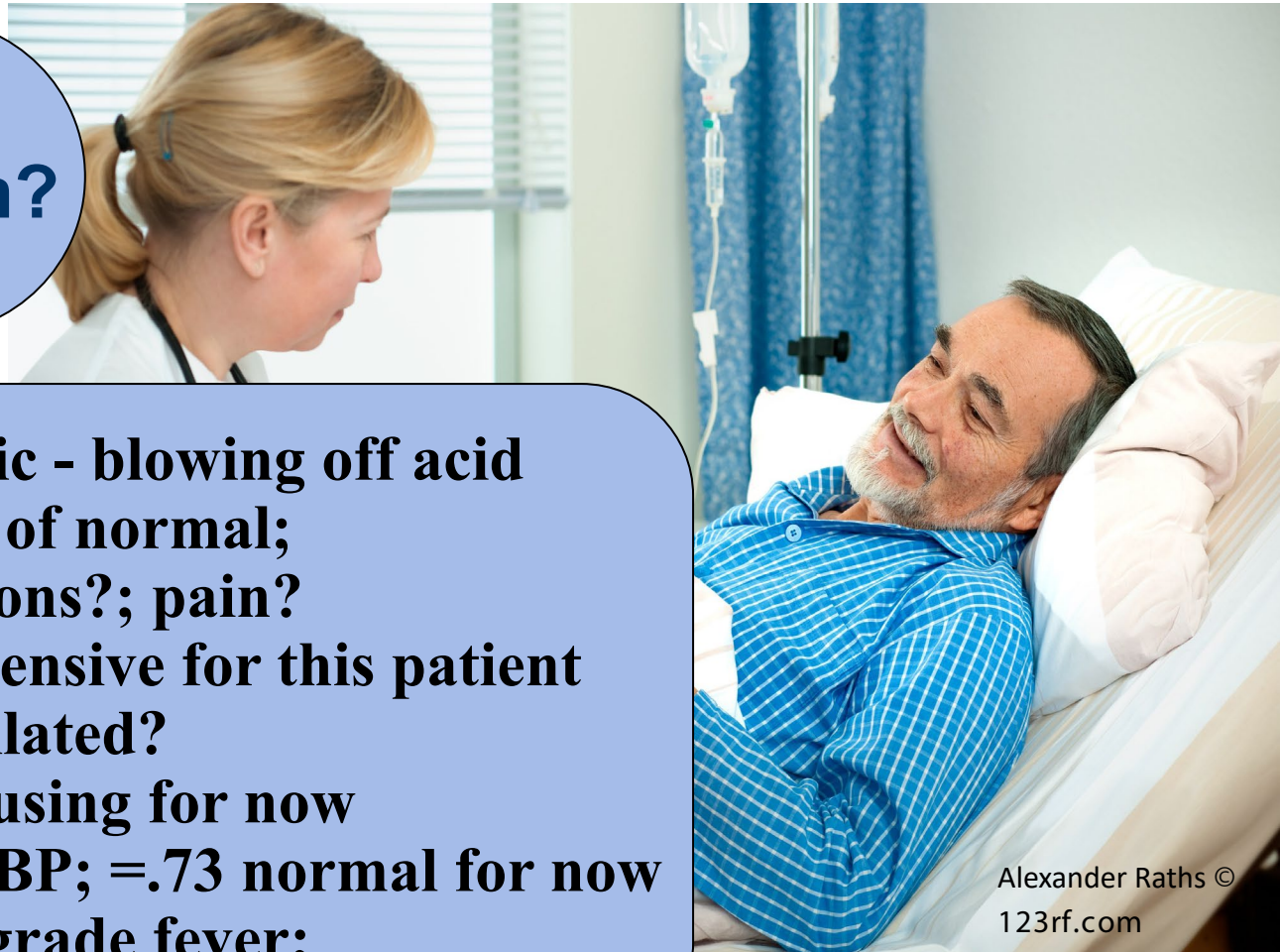


# Case

## Study # 2

**Vital sign  
Compensation?  
YES**

- **RR 23 –Tachypneic - blowing off acid**
- **HR 98 - high end of normal;  
medications?; pain?**
- **SBP 134 – normotensive for this patient**
  - **PP 71 – Vasodilated?**
  - **MAP 87– perfusing for now**
  - **SI 1.5 –  $HR < SBP$ ;  $=.73$  normal for now**
- **Temp 100.4 – low grade fever;  
atelectasis vs. infection?**



# Case Study # 2

**End Organ  
Dysfunction?  
YES**

**Diminished RML &  
RLL; ABG on 2L NC  
PaO<sub>2</sub> 82; Mucous  
membranes dry, Alert  
and oriented, pulse oxi  
92% on RA. Pee in the  
urinal**



# Case Study # 2

**Need  
Rescue?  
Suspect  
Shock?**



# **ABSOLUTELY**

# Some pearls about recognizing...



# Accountability

- **Clinical & Communication** Competence
- **Know** the story, patient and anatomy
- Every **minute** counts

# Assessment

- **Anticipate what will percolate!**
- **Systematic**
- **Hands & eyes**
- **Vital Signs ARE Vital**

# System

- Go with your **GUT!**
- **ESCALATE**
- Train **Everyone**
- **Know unit FTR data**
- **Debrief**
- **Innovate**



Nataliya Dvukhimenna©123rf.com

# VIGILANCE

Herbst, L. A., Desai, S., Benscoter, D., Jerardi, K., Meier, K. A., Statile, A. M., & White, C. M. (2018). Going back to the ward—transitioning care back to the ward team. *Translational pediatrics*, 7(4), 314.

Meyer, D. E., Vincent, L. A., Fox, E. E., O’Keeffe, T., Inaba, K., Bulger, E., ... & Cotton, B. A. (2017). Every minute counts: time to delivery of initial massive transfusion cooler and its impact on mortality. *The journal of trauma and acute care surgery*, 83(1), 19.



**The evidence is  
clear...**

**Early recognition AND  
reporting of clinical  
decline decreases  
preventable death**

**The nurse is downstream  
at the last point for rescue**

**Each moment is the opportunity to make a significant difference in the lives of others.  
Time matters. You matter. ACT NOW!**







**THANK YOU**

**Ellen M. Harvey DNP, RN, ACNS-BC, CCRN, TCRN, FCCM  
Carilion Roanoke Memorial Hospital  
[emharvey@carilionclinic.org](mailto:emharvey@carilionclinic.org)**