

# The Present & Future of Orthopedic Education

## Perspectives from a Technology Company



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Founder & Chairman Bullet Health – parent company Orthobullets

# Conflict

- Split my Time between Clinical Practice & Company
- ~50% Share Holder in Bullet Health (orthobullets).
- While I am a practicing surgeon, consider this an industry talk.
  - my conflict influences all of my opinions in the area of medical education.

# Future

1. Embrace Technology & Innovation
2. Prioritize HR Cultural Reform (Resident Training)

# Embrace Technology & Innovation

## 1. Assessment Tools (Driver)

1. Background
2. Aligned with practice
3. Prevents adverse outcomes
4. Expands in scope

## 2. Learning Technology

1. Personalized
2. Precise
3. Real Time

## 3. Data Science

1. Outcome Tools
2. Educational Registry

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- MCAT
- USMLE 1/2/3
- OITE
- ABOS I / II
- MOC

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Assessment/Certification Drives Learning & Teaching

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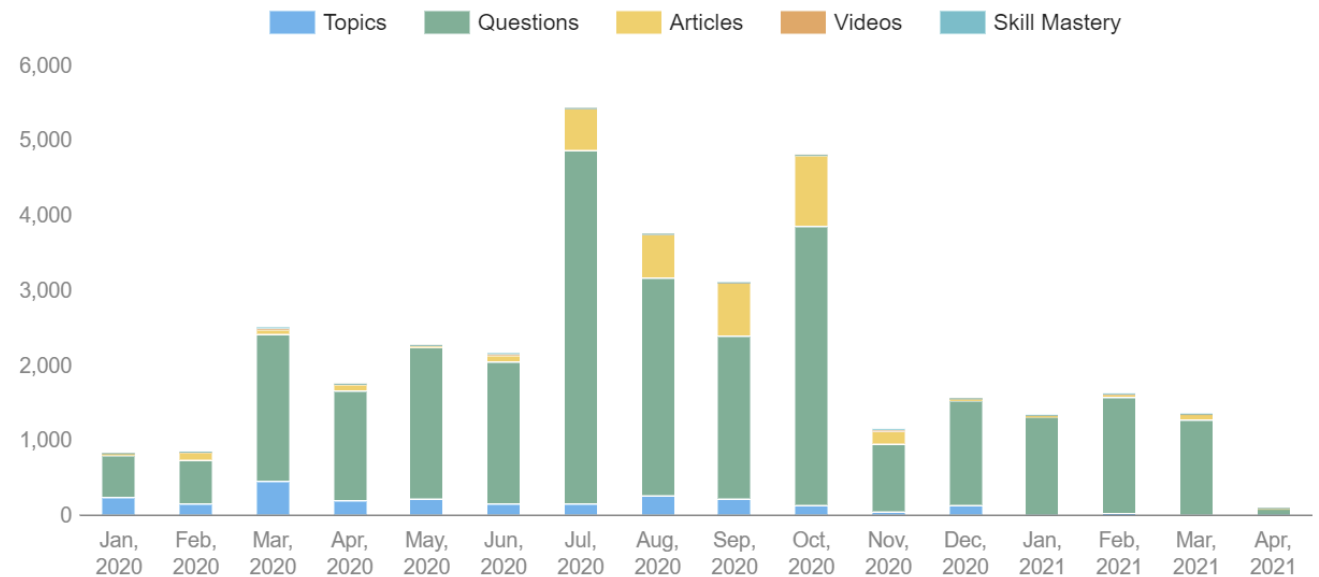
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OITE Leads to a Spikes in Resident Study Habits

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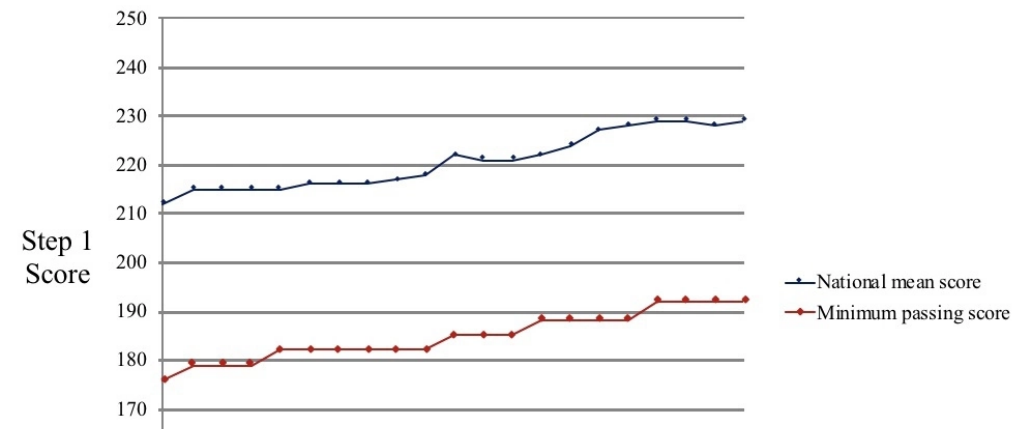
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National Mean and Minimum Passing USMLE Step 1 Scores, by Year



Nearly a quarter (23.5 percent) of second-year medical students reported in 2017 that they “almost never” attended class, an increase of 5 percentage points from 2015. And only about 13 percent of students reported attending lectures often.

Emphasis on USMLE Led to Drop in MS Attendance

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Next Slide



## Aligned with Practice

|     |   |
|-----|---|
| AGE | <b>76 / Female</b>  |
| CC  | Right hip pain  |
| HPI | A 76-year-old female presents after a mechanical fall onto her right side. She had immediate hip pain and inability to ambulate. She is a community ambulator at baseline without any assistive devices. She notes no significant hip pain prior to her fall. |
| PMH | HTN, HLD, anxiety, 1/2 pack per day smoker  |
| PE  | BMI 33. Her skin is intact and her right leg is externally rotated and shorter than the left leg. She has pain with any lower extremity motion, but is neurovascularly intact distally.   |

PRE-PROCEDURE IMAGES:



## Aligned with Practice

|     |  |
|-----|--|
| AGE | 76 / Female  |
| CC  | Right hip pain   |
| HPI | A 76-year-old female had immediate ambulator at baseline hip pain prior to |
| PMH | HTN, HLD, anxiety  |
| PE  | BMI 33. Her skin is thinner than the left leg neurovascularly              |

**Q** 2) How would you manage this injury?

Nonoperative  
0% (18/2503)

Operative  
98% (2475/2503)

Outside my area of expertise - best if I don't vote  
0% (10/2503)

Add a related question.      Poll references

-0.0    +11



## Aligned with Practice

|     |  |
|-----|--|
| AGE | 76 / Female  |
| CC  | Right hip pain   |
| HPI | A 76-year-old female had immediate hip pain and was unable to walk on ambulator at base of stairs. She had hip pain prior to her fall. |
| PMH | HTN, HLD, anxiety  |
| PE  | BMI 33. Her skin is more tanned than the left leg. She has no neurovascularly in her leg.  |

**Q** 4) If you choose Operative management, what surgical technique would you use?

I would not choose Operative management  
0% (3/2492)

Open reduction internal fixation (ORIF)  
3% (82/2492)

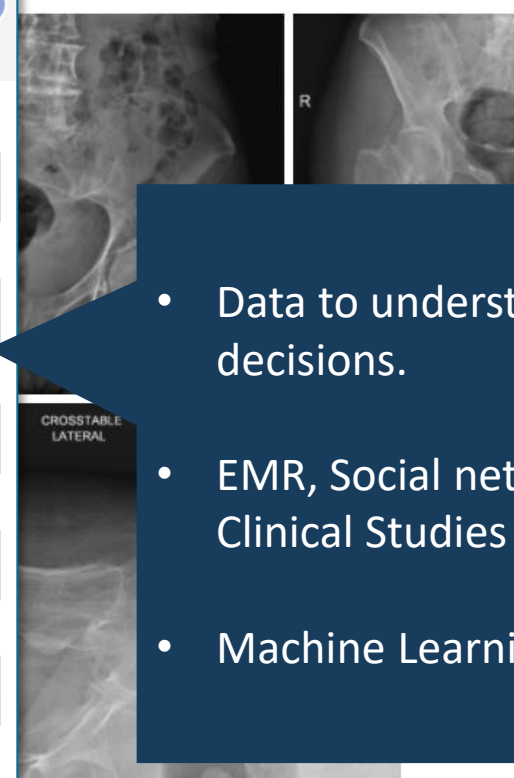
Hemiarthroplasty  
44% (1117/2492)

Total hip arthroplasty (THA)  
51% (1273/2492)

Outside my area of expertise - best if I don't vote  
0% (17/2492)

Add a related question. [?](#) [Poll references](#)

IMAGES:



- Data to understand complex decisions.
- EMR, Social networks, Clinical Studies
- Machine Learning (AI)

Assessment Needs to be Aligned with Actual Practice of Medicine

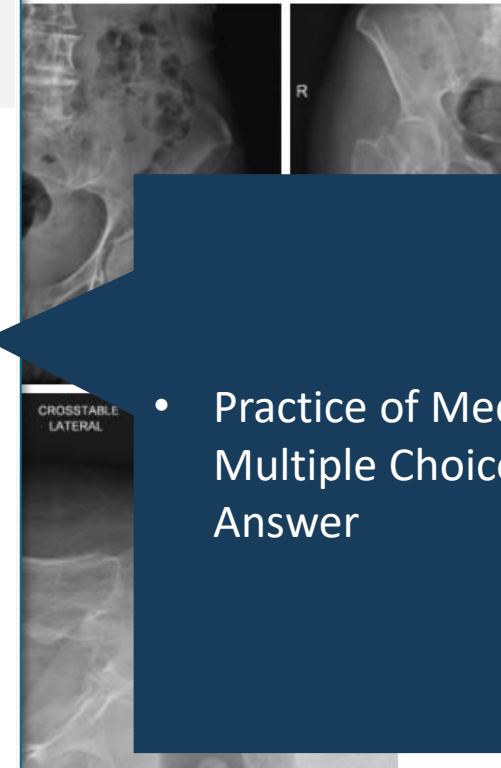
## Aligned with Practice

|     |  |
|-----|--|
| AGE | 76 / Female  |
| CC  | Right hip pain   |
| HPI | A 76-year-old female had immediate hip pain and was placed on a walker/ambulator at baseline. She had no hip pain prior to her fall.           |
| PMH | HTN, HLD, anxiety, 1/2   |
| PE  | BMI 33. Her skin is intact and well perfused. Her right leg is swollen and tender compared to the left leg. She has no neurovascularly intact. |

**Q** 3) If you choose Operative management, assuming the patient arrived in the ER at 5 pm, with their last full meal at 2 pm, and is medically optimized, when would you perform Operative management?

|   |     |            |      |      |
|---|-----|------------|------|------|
| I would not choose Operative management   | 0%  | (6/2493)   | -    | +    |
| Same night (within 6 hours of arrival to ER)  | 11% | (298/2493) | -0.0 | +0.0 |
| Following morning first case, Bump elective cases, Cancel clinic if scheduled (12-24 hours)         | 40% | (998/2493) | -0.0 | +0.0 |
| Following day after elective cases, After clinic (24 - 32 hours)                                    | 33% | (839/2493) | -0.0 | +0.0 |
| When convenient within 3 days from admission (OR available, don't change clinic, start before 5 pm) | 12% | (303/2493) | -    | +    |
| When convenient within 5 days from admission (OR available, don't change clinic, start before 5 pm) | 1%  | (27/2493)  | -    | +    |
| Outside my area of expertise - best if I don't vote   |     |            |      |      |

IMAGES:



- Practice of Medicine is not a Multiple Choice / 1 Correct Answer

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Modern Assessment Prevents Adverse Outcomes

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Controversial

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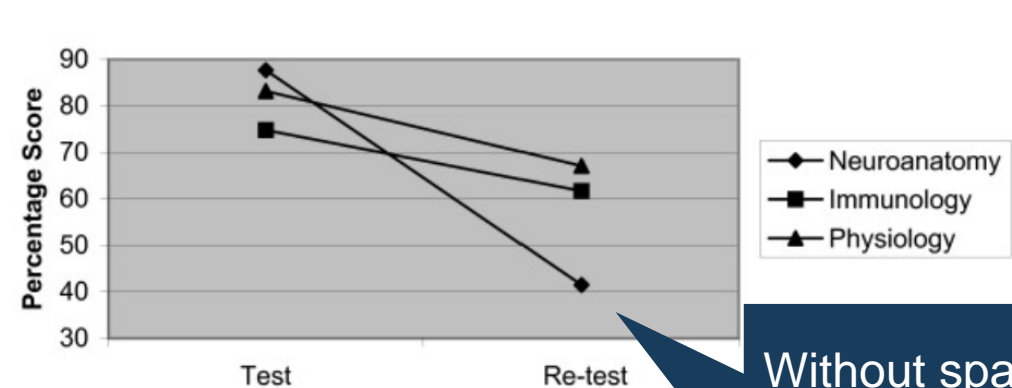
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Figure 1



Test and Re-test scores 10 or 11 months apart for three basic science subjects at the University of Saskatchewan.

Without spaced repetition, medical students forgot **17.6% to 52.7%** of their basic science knowledge after 11 months

Value = Quality (retention) / Cost (time and money)



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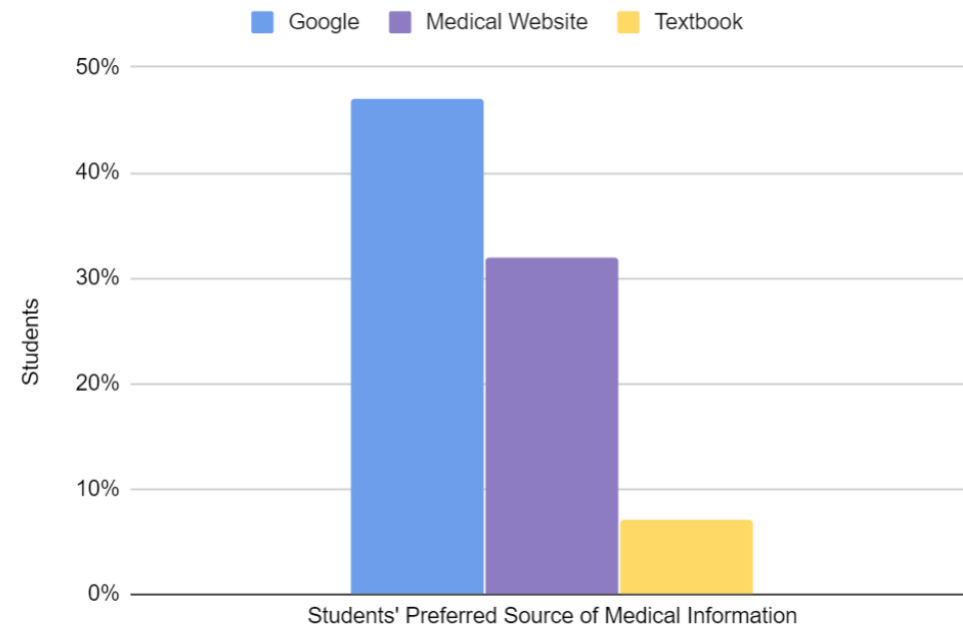
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Precise small content fits needs of learner.

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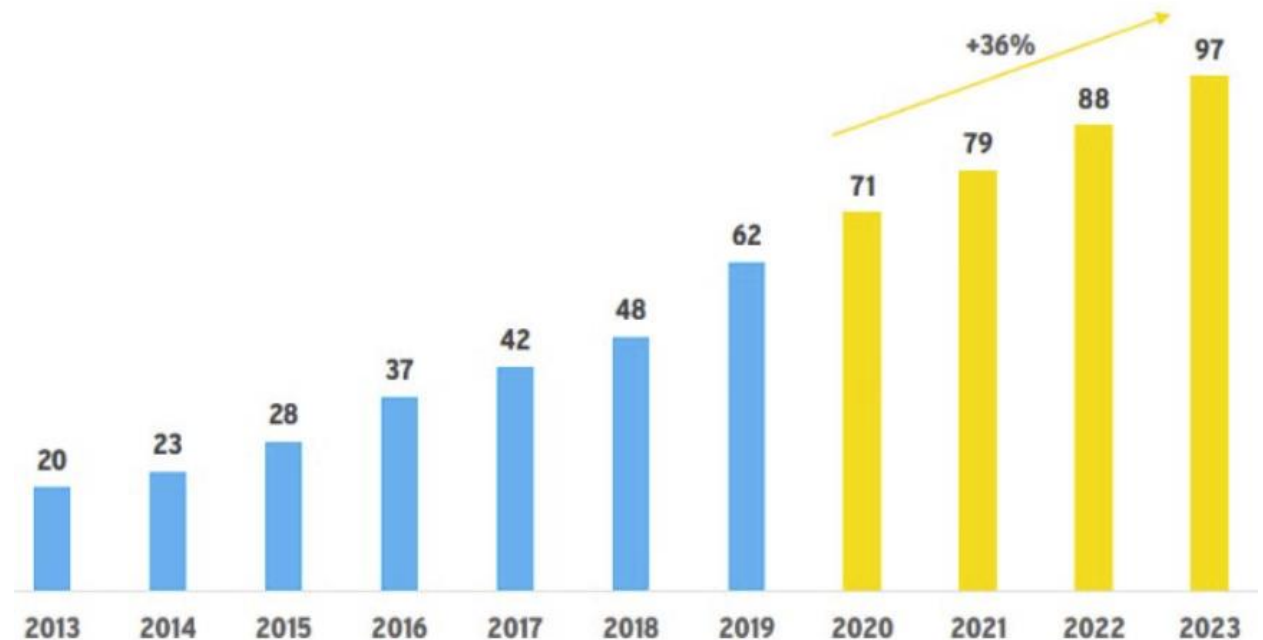
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Podcast Growth



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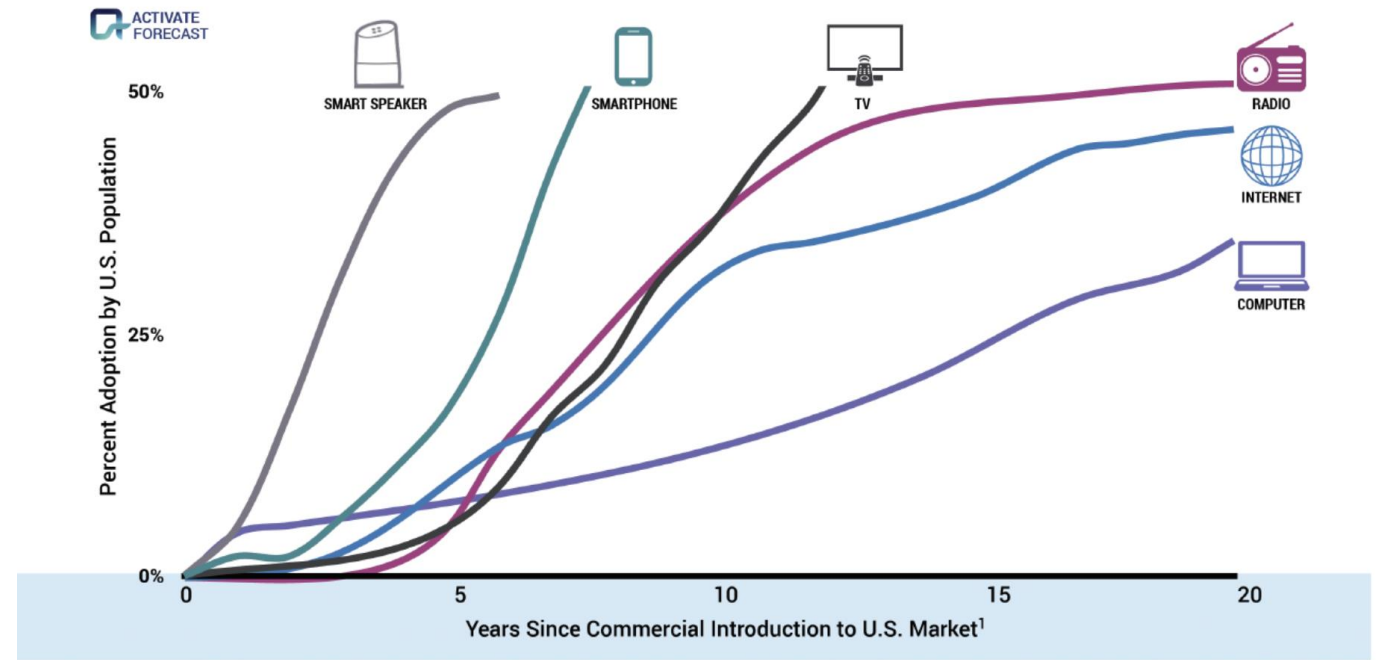
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### Voice Technology



Precise small content fits needs of learner.

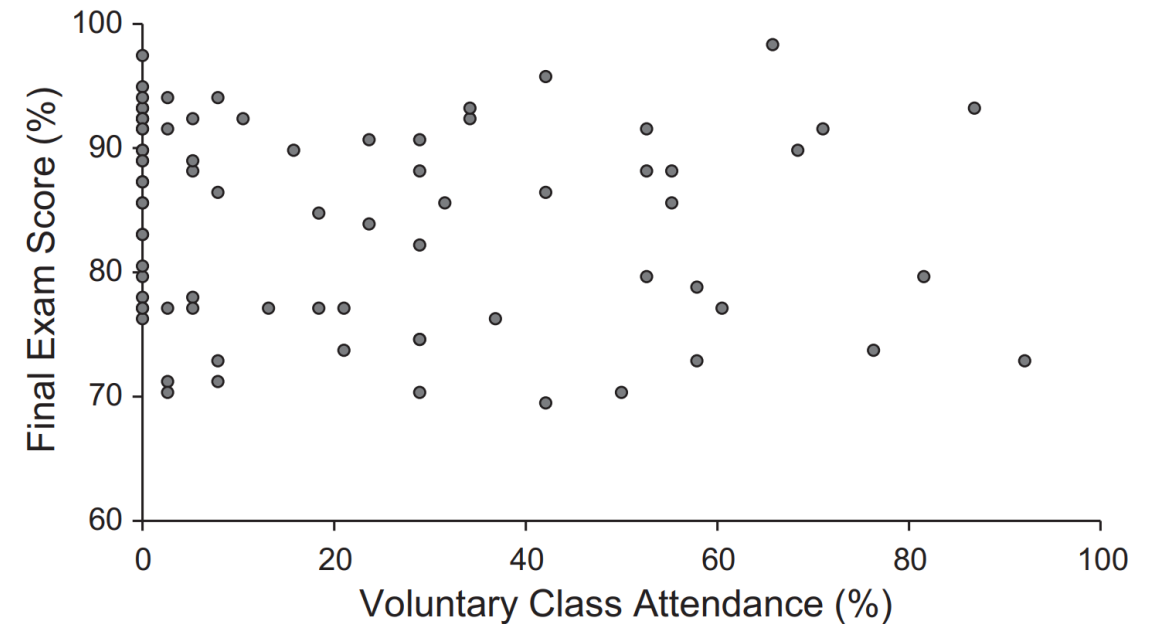
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Classrooms by nature are not personalized.

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- Bedside Teaching
- Point of Care (AMA)
- Mission Critical Learning
- Just-in-Time Learning

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$$\text{Value} = \text{Quality (retention)} / \text{Cost (time \& \$)}$$

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- Rule-Based
- SM2
- Half Life Regression
- Machine Learning

Only Possible with Algorithm

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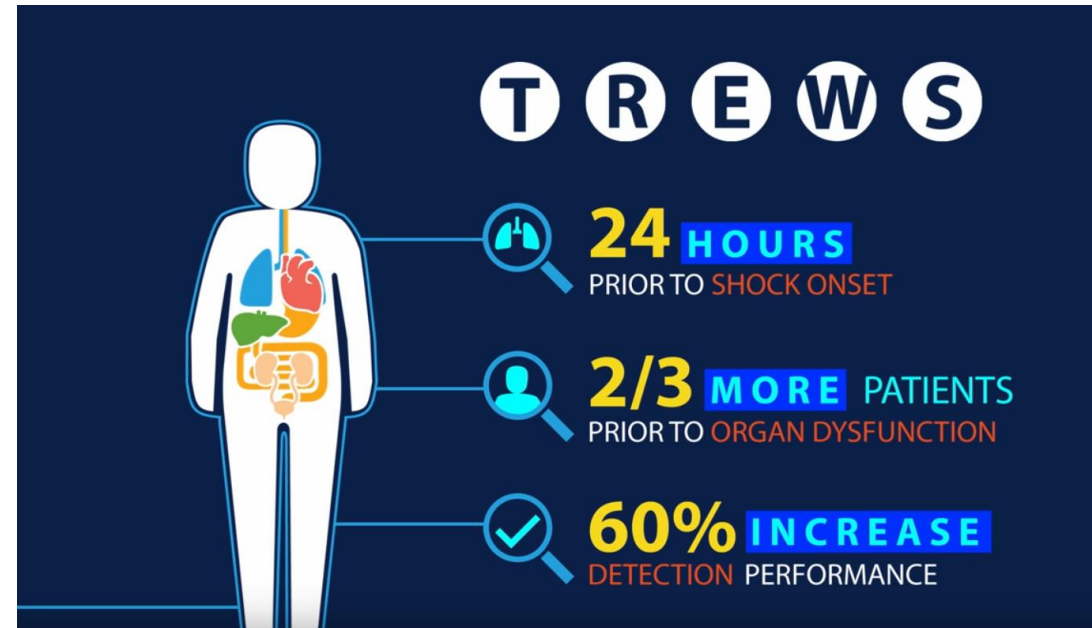
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•ML that compares one patients clinical data to EMR database to diagnose sepsis faster than a doctor can.

Machine Learning has real potential.

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- Standardized Outcomes Tools
- Educational Registries
- Identification of Bias



# Drive Human Resource Reform

1. Properly Incentivize Faculty to Educate
2. Promote/Pay Resident Based on Productivity
3. Create Resident Program Exchange to Improve Fit/Wellness