

Laboratory Medicine's Role in Patient Safety at the "Sharp End"

One Clinician's Perspective

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Why does
"Everyday
Practice"
deviate from
"Best
Practice?"

INTERVENTION

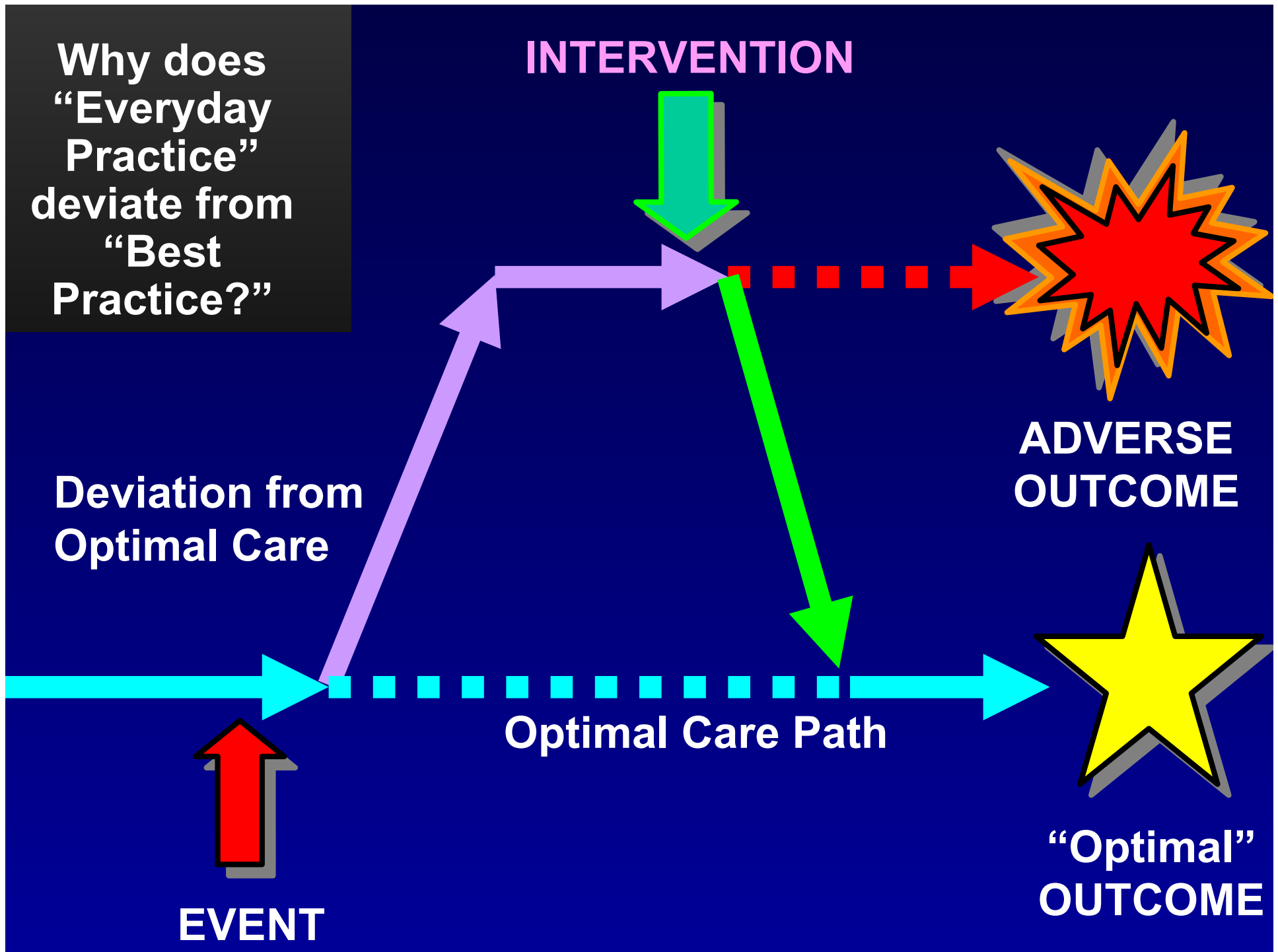
Deviation from
Optimal Care

ADVERSE
OUTCOME

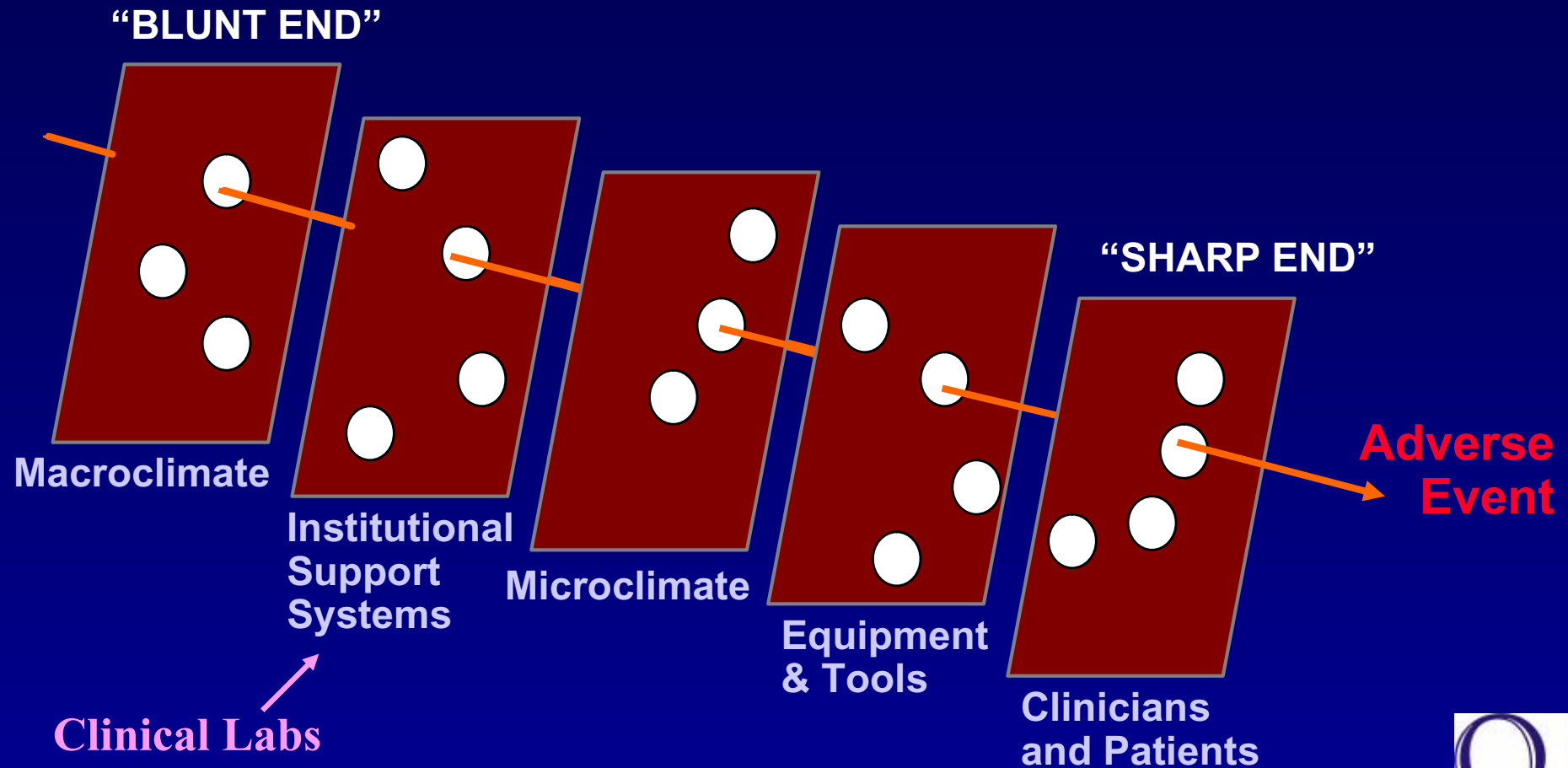
Optimal Care Path

"Optimal"
OUTCOME

EVENT



The Swiss Cheese Model of System Failure



→ **Event Trajectory**

After James Reason

All Laboratory Services Interact with the Sharp End

- Clinical laboratories
- Blood bank
- Tissue bank
- Surgical pathology
- Forensic pathology

... and their performance can yield both active errors and latent failures.

Real-Life Example

- **Healthy wife of Dean's best friend for an elective vaginal hysterectomy and urinary incontinence repair.**
- **During the procedure, chief resident breaks a retention suture, and substantial oozing ensues.**
- **Attending considers re-exploring but decides to close and observe.**
- **First postoperative hematocrit is 32.**

Post-Operative Course

- Repeat hematocrit 4 hours later is 15.
- Attending is called, and he finds a cold, clammy, pale patient with a modestly increased heart rate. Other vital signs and urine output are normal.
- Attending decides to return urgently to operating room for re-exploration.
- Anesthesia won't induce patient until blood is available for transfusion

Return to the OR

- **Type & Cross for 4 units ordered and repeat hematocrit sent to lab.**
- **Lab can't find Type & Screen sent 6 hours earlier ... surgeon told blood will be delayed.**
- **General anesthesia is induced.**
- **Repeat hematocrit is reported as 32.**
- **iStat arterial blood gas yields Hct 33.**
- **Patient is awakened without surgery.**

What Can (& Does) Go Wrong?

- Lost or “inadequate” sample
(by far the most common!)
- Wrong sample (e.g., wrong patient)
- Delayed result (also common)
- Wrong result – False positive or false negative (*Isn't the lab infallible?*)
- Result reporting method not well aligned with clinical workflow
- Lack of follow-up of abnormal result

The Hidden Costs of Medical Technology

- **False positives**
(Unnecessary exposure to therapeutic risks & side-effects)
- **False negatives**
(Failure to detect abnormalities or institute necessary therapy)
- **Law of Diminishing Value**
(Technology is least reliable when it is most needed)
- **Over-reliance on “reliable” technology.** (Failure to detect abnormalities or validate results)



Integration with Clinical Information Systems

- Laboratory services are increasingly integrated into systems for ...
 - Electronic medical recordkeeping
 - Computerized physician order entry
 - Clinical decision support
- *Tremendous opportunity for creation of new modes of system failure!*

New Modes of System Failure

- **Usability issues** – *clinician misses or misreads laboratory result on crowded CRT.*
- **Automation** – *reliance on electronic clinical reminders leads to assuming all OK if none.*
- **Tighter coupling** – *single error can be propagated to many patients very quickly.*
- **Workflow issues** – *difficulty accessing system precludes use when really needed.*
- **Technology failure** – *system crashes, results or ordering unavailable.*

The Clinicians' *Expectations of the Lab*

- **100% accurate results (error free)**
- **100% reliable service**
- **100% on-time results or products**
- **No added work or interruptions**
- **Effective communication with a live person when needed**
- **Understand what we need, why, and when we need it ...**

Human Factors?

- The study of human interactions with tools, processes, and systems ...
- ... to enhance safety, efficiency, and user satisfaction.
- Successfully applied in a wide range of domains (fighter planes, kitchens, computer screens, and defibrillators).
- Essential tools for understanding and enhancing patient safety.

Understanding Practice at the *Sharp End* ...

*Don't be left
in the water!*

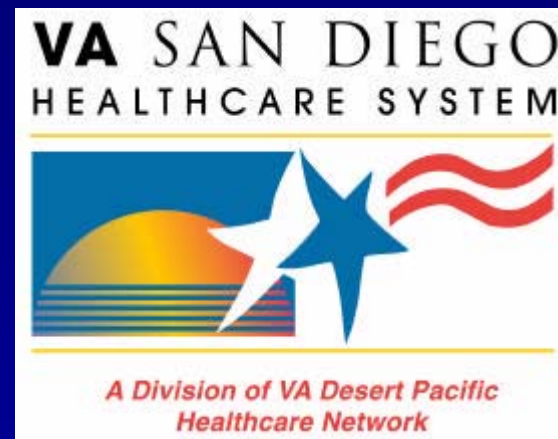


... is essential to creating new processes
and systems to support quality care.

Recommendations for Laboratory Medicine

- Set the standard for error-resistant, robust, and continually improving healthcare processes.
- Understand better clinicians' needs and then strive to meet those needs.
- Integrate lab medicine into overall clinical workflow.
- Carefully test all solutions before full-scale implementation.

Thank You



Point-of-Care Testing from the clinicians' perspective

- **There are Real Benefits ...**
 - Rapid results
 - Convenient, retain control, less paperwork
 - Use less blood
 - Samples not lost
- **But also Disadvantages ...**
 - Accuracy and reliability can be problematic
 - New administrative burdens (training, documentation, need for data download)

Organizational Focus on “Efficiency” Can Adversely Affect Safety

Safety Focus

Efficiency Focus

Redundancy (Just in Case)	Optimization (Just in Time)
Accept diversity and variability	Promote standardization
Adaptive and flexible	Resistant to change
Adverse events as information	Adverse events as anomalies
Pessimism about outcomes	Optimism about outcomes
Reward the messenger	Shoot the messenger
Error tolerant	Error prone