Implementation Science Approaches & Outcomes Measurement

Elliott R. Haut, MD, PhD, FACS
Vice Chair of Quality, Safety, & Service
Associate Professor of Surgery, Anesthesiology & Critical Care Medicine, Emergency Medicine, Health Policy & Management

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#TraumaVTE22
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Disclosures

- Some of this work has been funded by
  - Patient Centered Outcomes Research Institute (PCORI)

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Implementation Science

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"Practical Guide to Implementation Science"

- Implementation science is the study of methods and strategies to promote the adoption and integration of proven clinical treatments, practices, organizational, and/or management interventions into routine practice and hence to improve health.

Neuman, Kaji, Haut. *JAMA Surg* 2020

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"Practical Guide to Implementation Science"

1. Actively design and evaluate interventions with implementation and future dissemination in mind.
2. Create a transdisciplinary research team with key stakeholders from all relevant groups.
3. Plan the study using a standard implementation science framework (eg, Translating Evidence Into Practice, Consolidated Framework for Implementation Research).
4. Consider using the hospital floor, outpatient clinic, hospital, or practice as the randomized implementation unit, rather than randomizing individual patients.
5. Assess outcomes via an established framework (ie, the Reach, Effectiveness, Adoption, Implementation, and Maintenance framework) using mixed methods.
6. Manuscripts should follow standard reporting requirements (ie, Strengthening the Reporting of Observations Studies in Epidemiology, Standards for Reporting Qualitative Research).

Neuman, Kaji, Haut. *JAMA Surg* 2020

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"How Implementation Science in Surgery Is Done"

Conclusions

Implementation science can promote the uptake of evidence-based surgical interventions into clinical practice and improve the consistency of high-quality care after surgery. The ability of surgeons to appreciate and use implementation science in their own research will be greatly facilitated by training, stakeholder engagement, and funding opportunities.

SURGICAL OUTCOMES CLUB

Smith, Brooke. *JAMA Surg* 2019

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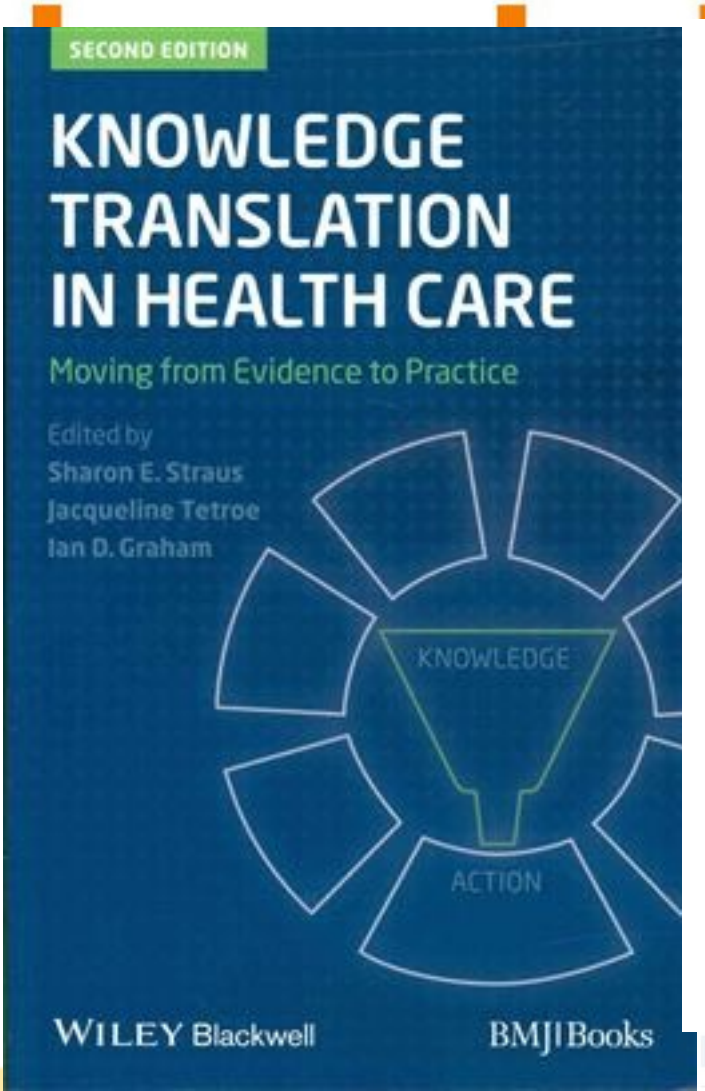
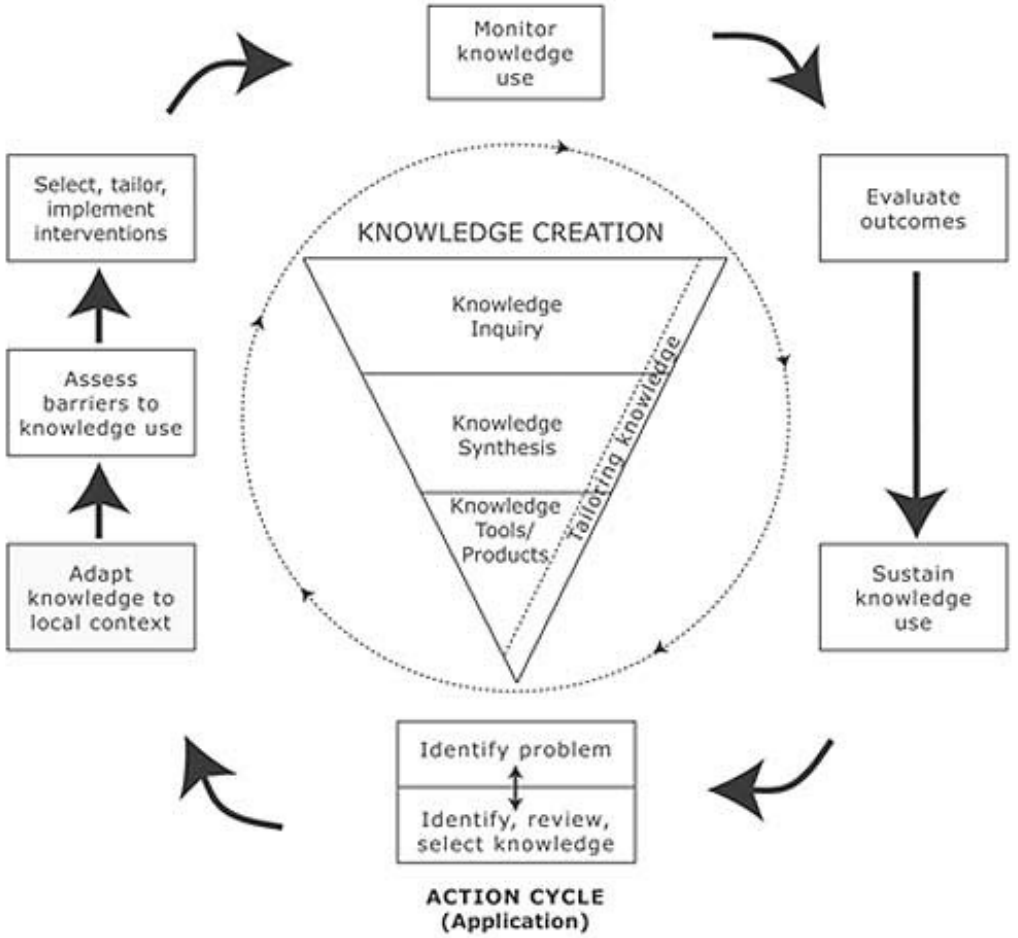
Rigorous Scientific Approaches to Changing Practice





Translating evidence into practice: a model for large scale knowledge translation

Changes that can improve patients' health are often difficult to get into practice, even when backed by good evidence. **Peter Pronovost**, **Sean Berenholtz**, and **Dale Needham** describe a collaborative model that has been shown to work

BMJ | 25 OCTOBER 2008 | VOLUME 337

Our model combined culture change and evidence with rigorous measurement . . . clinicians (especially doctors) perceived the measures and results as valid

- About 350 citations
- JAMA, Ann Surg, BMJ, Chest, PlosOne, Circulation, CCM, Health Affairs

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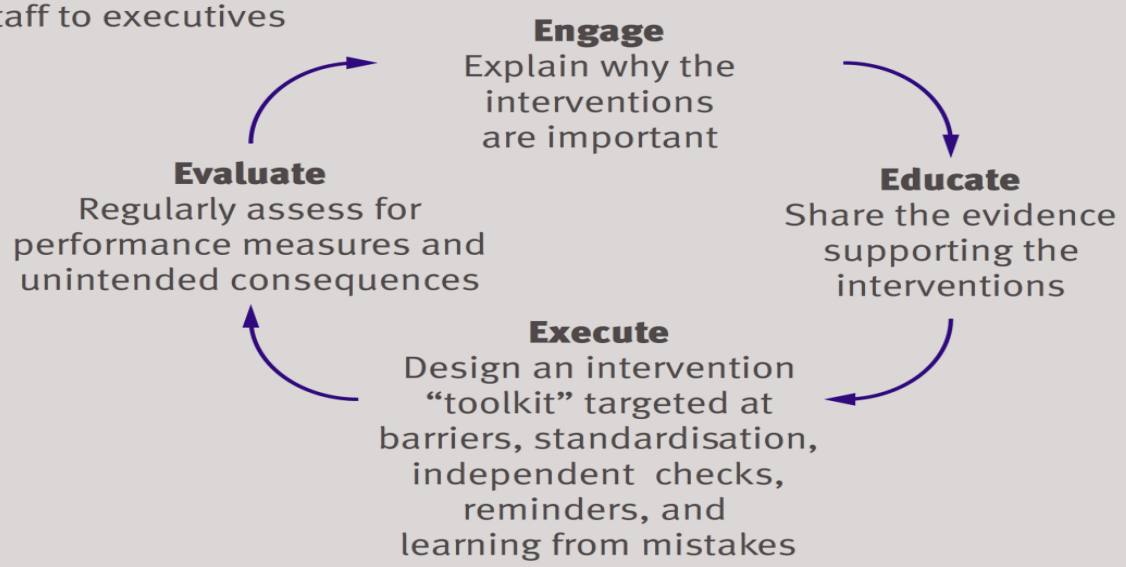
Overall concepts
Envision the problem within the larger healthcare system
Engage collaborative multidisciplinary teams centrally (stages 1-3) and locally (stage 4)

1. Summarise the evidence
Identify interventions associated with improved outcomes
Select interventions with the largest benefit and lowest barriers to use
Convert interventions to behaviours

2. Identify local barriers to implementation
Observe staff performing the interventions
"Walk the process" to identify defects in each step of implementation
Enlist all stakeholders to share concerns and identify potential gains and losses associated with implementation

3. Measure performance
Select measures (process or outcome)
Develop and pilot test measures
Measure baseline performance

4. Ensure all patients receive the interventions
Implement the "four Es" targeting key stakeholders from front line staff to executives



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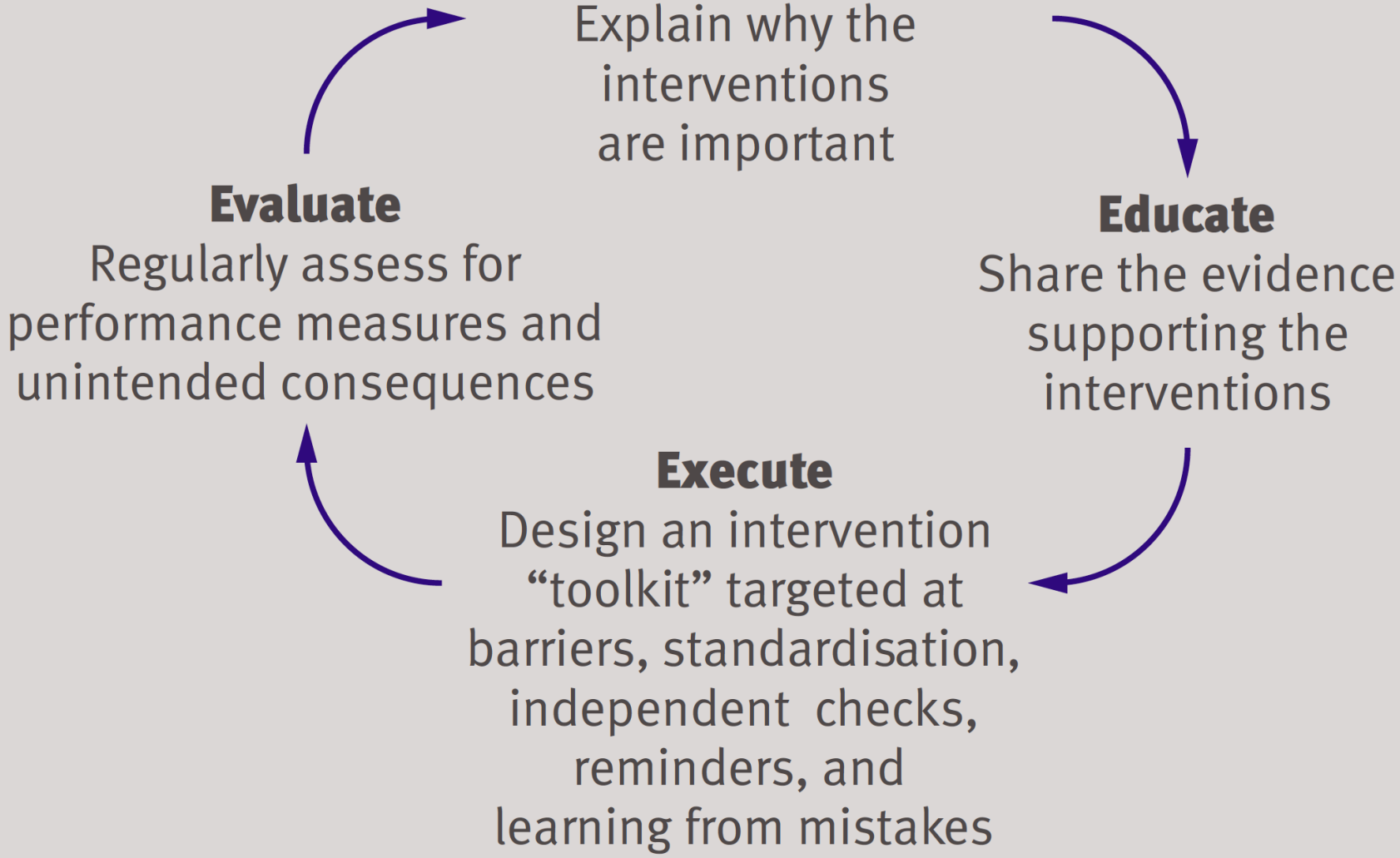

Consolidated Framework for Implementation Research (CFIR)

- “Provides a menu of constructs that have been associated with effective implementation”
- Barriers and Facilitators

https://cfirguide.org/

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Consolidated Framework for Implementation Research (CFIR)

Intervention characteristics	Outer setting	Inner setting	Characteristics of Individuals	Process of implementation

- Intervention source
- *Evidence Strength & Quality*
- **Relative advantage**
- **Adaptability**
- *Trialability*
- **Complexity**
- *Design Quality & Packaging*
- **Cost**
	- Patient Needs & Resources
	- *Cosmopolitanism*
	- Peer pressure
	- *External Policy & incentives*
		- **Structural Characteristics**
		- Networks & Communications
		- Culture
		- Implementation Climate
		  - **Tension for Change**
		  - **Compatibility**
		  - Relative Priority
		  - **Organizational Incentives & Rewards**
		  - *Goals & Feedback*
		  - Learning Climate
		- Readiness for Implementation
		  - **Leadership Engagement**
		  - **Available Resources**
		  - Access to Knowledge & Information
			- *Knowledge & Beliefs about the Intervention*
			- *Self-Efficacy*
			- **Individual Stage of Change**
			- Individual Identification with Organization
			- Other Personal Attributes
				- *Planning*
				- **Engaging**
				  - Opinion Leaders
				  - Formally Appointed Internal Implementation Leaders
				  - **Champions**
				  - External Change Agents
				- Executing
				- *Reflecting & Evaluating*

Van Oers, *Qual Life Res* 2021

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Open access

Dissemination, implementation, and de-implementation: the trauma perspective

TRAUMA SURGERY & ACUTE CARE OPEN

Ho, Dicker, Haut, *TSACO* 2020

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Implementation Science Outcomes

Table 1 Outcomes for implementation science

Implementation outcomes	
Acceptability	The perception among implementation stakeholders that a given treatment, service, practice, or innovation is agreeable, palatable, or satisfactory *Synonyms*: Satisfaction with various aspects of the innovation (eg, content, complexity, comfort, delivery, and credibility)
Adoption	The intention, initial decision, or action to try or employ an innovation or evidence-based practice *Synonyms*: Uptake; utilization; initial implementation; intention to try
Appropriateness	The perceived fit, relevance, or compatibility of the innovation or evidence-based practice for a given practice setting, provider, or consumer; and/or perceived fit of the innovation to address a particular issue or problem. "Appropriateness" is conceptually similar to "acceptability," and the literature reflects overlapping and sometimes inconsistent terms when discussing these constructs *Synonyms*: Perceived fit; relevance; compatibility; suitability; usefulness; practicability
Implementation costs	Cost impact of an implementation effort, dependent on three components: variation in complexity of treatments, variation for complexity of implementation strategy, variation by setting and overhead *Synonyms*: Marginal cost; cost-effectiveness; cost–benefit
Feasibility	The extent to which a new treatment, or an innovation, can be successfully used or carried out within a given agency or setting. Actual fit or utility; suitability for everyday use; practicability
Fidelity	The degree to which an intervention was implemented as it was prescribed in the original protocol or as it was intended by the programme developers *Synonyms*: Delivered as intended; adherence; integrity; quality of program delivery
Penetration	Integration of a practice within a service setting and its subsystems *Synonyms*: Level of institutionalization; spread; service access
Sustainability	The extent to which a newly implemented treatment is maintained or institutionalized within a service setting's ongoing stable operations *Synonyms*: Maintenance; continuation; durability; incorporation; integration; institutionalization; sustained use; routinization

Ho, Dicker, Haut, *TSACO* 2020

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So what does this all have to do with VTE?

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A Big Assumption

- As physicians, we assume that medication orders we place are consistently delivered
- But is that truly the case?
- Does prescription = administration?

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Steps to Optimal Pharmacologic VTE Prophylaxis

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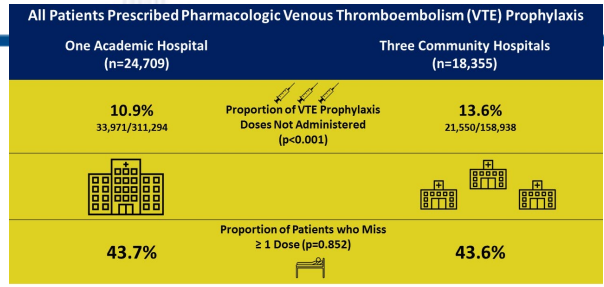
Missed Doses of VTE Prophylaxis Matter

Association Between Missed Doses of Chemoprophylaxis and VTE Incidence in a Statewide Colectomy Cohort

Rhami Khorfan, MD, MS, Lindsey Kreutzer, MPH,† Remi Love, MA,† Cary Jo R. Schlick, MD,* Matthew Chia, MD,* Karl Y. Bilimoria, MD, MS,*† and Anthony D. Yang, MD, MS*†✉*

(*Ann Surg* 2021;273:e151–e152)



Lau, et al. JGIM 2017

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Original Investigation | PACIFIC COAST SURGICAL ASSOCIATION

Correlation of Missed Doses of Enoxaparin With Increased Incidence of Deep Vein Thrombosis in Trauma and General Surgery Patients

Scott G. Louis, MD; Misa Sato; Travis Geraci, MD; Ross Anderson, BS; S. David Cho, MD; Philbert Y. Van, MD; Jeffrey S. Barton, MD; Gordon M. Riha, MD; Samantha Underwood, MS; Jerome Differding, MPH; Jennifer M. Watters, MD; Martin A. Schreiber, MD

PLOS ONE: Patterns of Non-Administration of Ordered Doses of Venous Thromboembolism Prophylaxis: Implications for Novel Interver

PLOS ONE

Patterns of Non-Administration of Ordered Doses of Venous Thromboembolism Prophylaxis: Implications for Novel Intervention Strategies

Kenneth M. Shermock , Brandyn D. Lau, Elliott R. Haut, Deborah B. Hobson, Valerie S. Ganetsky, Peggy S. Kraus, Leigh E. Efird, Christoph U. Lehmann, Brian L. Pinto, Patricia A. Ross, Michael B. Streiff

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Nurse Education Improves VTE Prophylaxis Administration

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Nurse Education Improves Missed Doses of VTE Prophylaxis

Adult Medical and Surgical Nurses at The Johns Hopkins Hospital (n=933)

Nurses Cluster Randomized by Floor to Receive One of Two Education Modules about Venous Thromboembolism (VTE) Prevention

Primary Outcome	**Any Education**	**VTE Prophylaxis Non-Administration (p=0.002)**	12.4% → 11.1% OR: 0.87, 95% CI: 0.80-0.95

RANDOMIZATION

Dynamic Scenario-based Education

Linear Static Education

Secondary Outcomes	10.8% → 9.2% OR: 0.83, 95% CI: 0.72-0.95	**VTE Prophylaxis Non-Administration (p=0.26)**	14.5% → 13.5% OR: 0.92, 95% CI: 0.81-1.03
		Satisfaction (p<0.05)	

Lau, et al. PLOS ONE 2017

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Published by Public Library of Science

SCAN ME

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Lau, PLoS ONE 2017

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Success of a Patient Education Bundle on VTE Prophylaxis

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Patient Education Bundle

- One-on-one, face-to-face engagement with a nurse educator
- 2-page patient education sheet
- 10-minute patient education video

Haut, JAMA Network Open 2018

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What Do Patients Want? Paper Form (2-pages)

	The Johns Hopkins Hospital Patient Information **How Do I Prevent Blood Clots?** **Venous Thromboembolism (VTE)** **Deep Vein Thrombosis (DVT)** **Pulmonary Embolus (PE)**	Original: Date 05/31/2014 Department: VTE Collaborative/Surgery
What is a blood clot or Venous Thrombo-embolism (VTE)?	Blood clots are called Venous Thromboembolism (VTE). There are 2 main types: • Deep Vein Thrombosis (DVT) is a clot in a deep vein, usually an arm or leg • Pulmonary Embolism (PE) is a clot that has broken off and traveled to the lungs. This can cause death.	

- www.hopkinsmedicine.org/armstrong/bloodclots

They spoke, we listened

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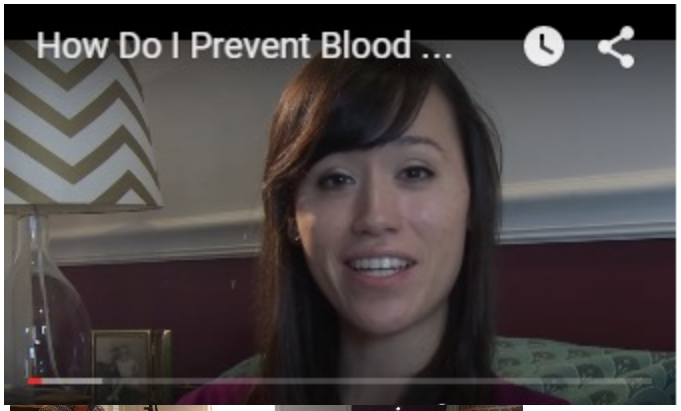
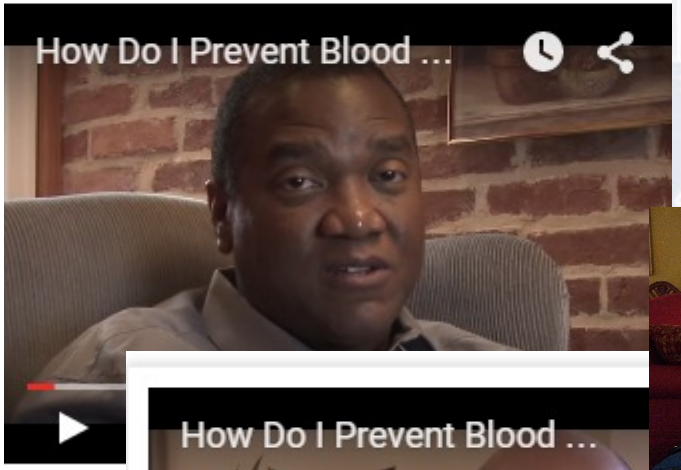
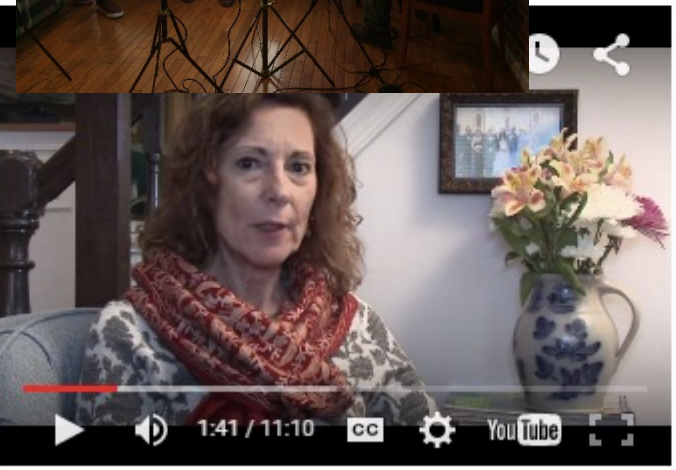
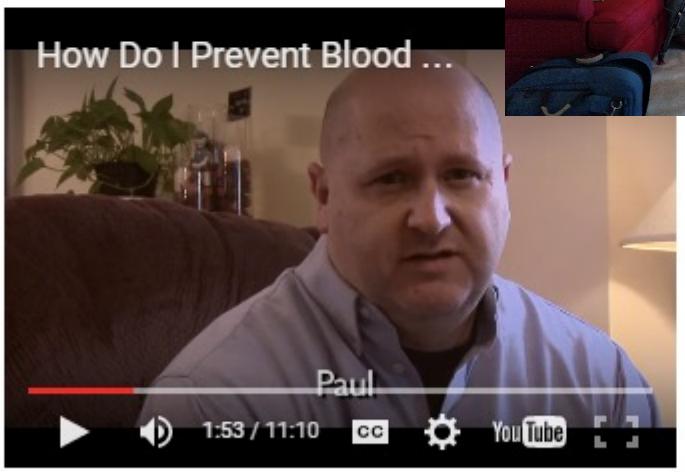
http://bit.ly/bloodclots
Video



>275,000 views on YouTube







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Patient Education Bundle Study Results

Adult Medical and Surgical Patients at The Johns Hopkins Hospital Prescribed Pharmacologic VTE Prophylaxis

12 Control Floors N=14,319		4 Intervention Floors N=5,333
No Alert		**Real-time Alert When Patients Miss Dose**
Usual Care		**Patient-Centered Education Bundle**
13.6% → 13.3% Conditional OR: 0.98 (95%CI: 0.91-1.07)	**VTE Prophylaxis Non-Administration (p<0.001)**	9.1% → 5.6% Conditional OR: 0.57 (95%CI 0.48-0.67)
8.7% → 8.5% Conditional OR: 0.98 (95%CI: 0.89-1.08)	**Patient Refusal (p<0.001)**	5.9% → 3.4% Conditional OR: 0.53 (95%CI 0.43-0.65)

JAMA Network Open

Haut ER, et al. *JAMA Network Open*. 2018
doi:10.1001/jamanetworkopen.2018.4741

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Implementation

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Generalizability (D&I) Award #2 PCORI

- Consortium of Leaders in the study Of Traumatic Thromboembolism (CLOTT)

- Project funded by PCORI Dissemination and Implementation (D&I) Award

pcori®

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CLOTT 3

CNTR

COALITION FOR NATIONAL TRAUMA RESEARCH

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Stakeholder Organizations

- National Blood Clot Alliance
- North American Thrombosis Forum
- Patient Safety Movement Foundation
- Society of Trauma Nurses
- American Trauma Society
- American College of Surgeons Committee on Trauma
- Coalition for National Trauma Research Board of Directors
- Coalition for National Trauma Research Scientific Advisory Council
- Eastern Association for the Surgery of Trauma
- Trauma Surgery & Acute Care Open
- American Association for the Surgery of Trauma

Multi-Center Study

1. University of Maryland
2. Oregon Health & Science University
3. Medical College of Wisconsin (Froedtert Hospital)
4. Stanford University (Stanford Health Care)
5. University of California – San Diego
6. University of California – San Francisco (Zuckerberg San Francisco
7. University of Utah
8. Medical University of South Carolina
9. Penn Medicine – Lancaster General Hospital
10. Christiana Hospital

Implementation Science: Facilitators & Barriers

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Facilitators

- Engaged leaders
- Involved multidisciplinary teams
- Standardized nurse education

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ARMSTRONG INSTITUTE
FOR PATIENT SAFETY AND QUALITY

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Essential Patient Safety and Quality Improvement Learning

https://www.hopkinsmedicine.org/armstrong_institute/training_services/eLearning/

bit.ly/NurseEducationVTE

Venous Thromboembolism Prevention: The Nurse's Perspective

This module focuses on the nurse's role in VTE prevention. It provides an overview of the latest information regarding VTE: prophylaxis, appropriate delivery of pharmacologic and mechanical methods, how to educate patients on VTE, and how to address missed and refused doses. It includes interactive cases, video, and real time knowledge assessment, and provides nurses with the skills to enable patients to make educated decisions.

Delivery Type
Online

Nurse Education Module
(percent complete by site)

Site	Completers	Percent of all Completers	*Each Site's Target #*	*Percent Completed*
A	212	21%	*235*	*90%*
B	111	11%	*131*	*85%*
C	127	12%	*157*	*81%*
D	30	3%	*172*	*17%*
E	49	5%	*117*	*42%*
F	105	10%	*115*	*91%*
G	53	5%	*60*	*88%*
H	49	5%	*58*	*84%*
I	88	9%	*126*	*70%*
J	72	7%	*118*	*61%*
Project Total	**896**	-	**1339**	**67%**

Data as of 4/27/2022

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Facilitators

- Validated patient education materials
- http://bit.ly/bloodclots (paper & video)
- Toolkit materials for roll-out

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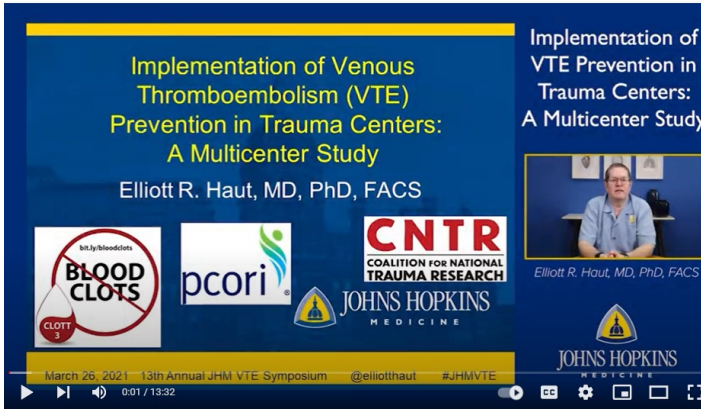
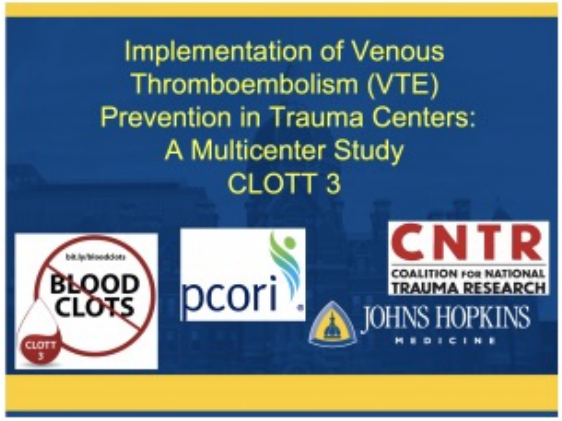
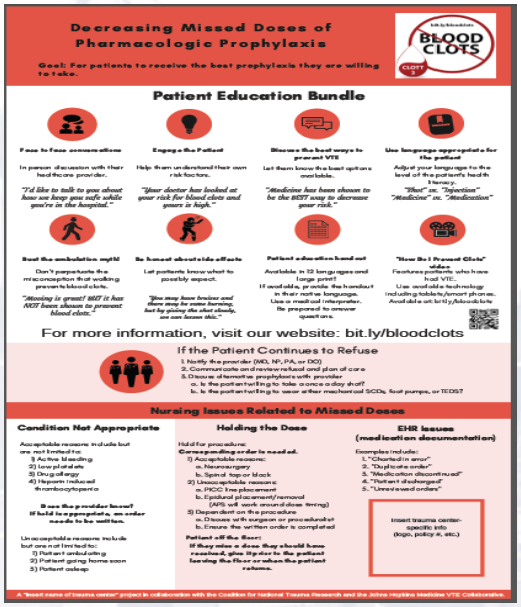
Implementation Materials



Short CLOTT 3 Slide Deck





How To Talk to Patients About VTE Prevention

- Let's talk about how to keep you safe in the hospital.
- Your doctor looked at your individual risk factors for blood clots.
- Medicine is the **best practice** for blood clot prevention.
- Walking has **NOT** been shown to prevent blood clots.
- Bruising and burning can happen, but we can lessen that by giving the shot slowly.
- Do you have questions about the handout or video?
- What is the best practice for you (shots, SCDs)?

BLOOD CLOTS

bit.ly/bloodclots

Strategies for Refused Doses

Provide Education Bundle ->

- Talk to Patient

AND

- Provide Education Handout

AND

- Show "How Do I Prevent Blood Clots?" Video

Still Refusing ->
Document and Notify Provider

Strategies for Missed Doses

Patient Off Floor ->
Give dose when patient returns

Patient Being Discharged ->
Give dose before discharge

Upcoming Procedure ->
Give dose unless hold ordered by prescriber

Condition Not Appropriate ->
Confirm with prescriber to hold dose

Duplicate Orders ->
Ask provider to correct

What to Know

- **Your blood clot risk**
- **What your provider has ordered**
- **How to prevent blood clots**

Learn More

- **Video**
- **Handout**
- **Visit this site for more info: bit.ly/bloodclots**

Implementation Materials

What to Know

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Learn More

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- Handout
- Visit this site for more info: bit.ly/bloodclots

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Barriers

- Competing Priorities
  - COVID-19

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The COVID-19 Effect

Editorial

COVID-19: The dark side and the sunny side for patient safety

Journal of Patient Safety and Risk Management
2020, Vol. 25(4) 137–141
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DOI: 10.1177/2516043520957116
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Perspective

AMERICAN COLLEGE OF MedicalQuality

Patient Safety and Quality Improvement Adaptation During the COVID-19 Pandemic

Robert S. Sterling, MD, FAAOS, FAOA[1], Stephen A. Berry, MD, PhD[2,3], Carrie A. Herzke, MD, MBA[2], and Elliott R. Haut, MD, PhD, FACS[3,4,5]

The Effect on Trauma Care Secondary to the COVID-19 Pandemic

Collateral Damage From Diversion of Resources

Elliott R. Haut, MD, PhD, FACS,†‡✉ Ira L. Leeds, MD, MBA, ScM,§ and David H. Livingston, MD, FACS¶*

Keywords: COVID-19, injury, quality, surgical care, trauma

(*Ann Surg* 2020;272:e204–e207)

left most hospitals in high prevalence areas to treat every trauma patient as potentially COVID positive. Although this may not yet be true outside of previous hotspots, it is becoming more apparent that

Barriers

- Research Hurdles
  - Variation in IRB approvals
- Informatics Barriers
  - Lack of interoperability
  - Multiple alert options
- Hospital Policies / Culture
  - Differential approaches to holding VTE prophylaxis
  - Variation in medication formularies
  - Diverse workflows

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Be Ready to Change PARTS of an Intervention

- Your proposed intervention may not be accepted "as-is"
- Original project had dedicated nurse educator
- How can it be adapted to the real world?
- Who has the final say?

- Issues of Acceptability, Adoption, Cost, Fidelity

Get It In Writing

- Look back at letters of support (or emails, meeting minutes, etc.)
- Be prepared for leadership and management turnover
- New team may not know what was promised or agreed to

Be Prepared to Battle with Bureaucracy

- Many committees need to approve education roll out
- At what level is the decision made?
  - Health system, hospital, functional unit, floor, nurse
- Different pathways for different hospitals?
- Informatics, Electronic Health Record (EHR) System

Be Ready to Advocate for Long-Term Continuation

- What happens after the funded “research” phase is over?
- Who takes over control for sustainability?
- Who pays the costs?
- Can you still stay involved and have a voice to push for fidelity?

Changing Practice is a Team Effort

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DEEP VEIN THROMBOSIS
DVT Blood Clots: Understand the Risk

DEEP VEIN THROMBOSIS

For More Info
@elliotthaut (Twitter) or ehaut1@jhmi.edu

- Hopkins VTE Website
  - http://www.Hopkinsmedicine.org/Armstrong/bloodclots
- Patient Education Video and Paper Handouts
  - http://bit.ly/bloodclots
- Nurse Education
  - https://www.hopkinsmedicine.org/armstrong_institute/training_services/eLearning/ or bit.ly/NurseEducationVTE
- CNTR Website
  - https://www.nattrauma.org/research/research-policies-templates-guidelines/clott-3-project-page/

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