

**THE ART OF EXECUTION**

Examining The Noose of Implementation Science

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**WHAT IS IMPLEMENTATION SCIENCE?**

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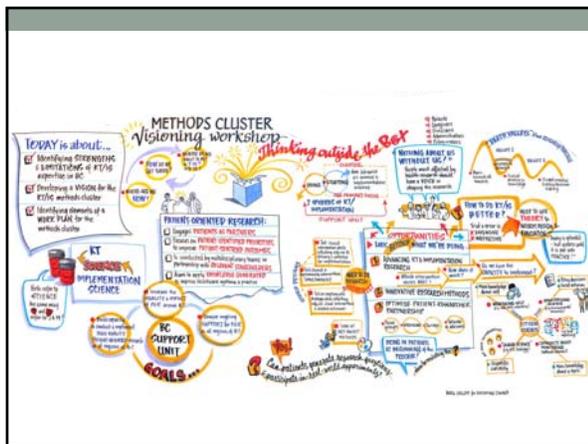
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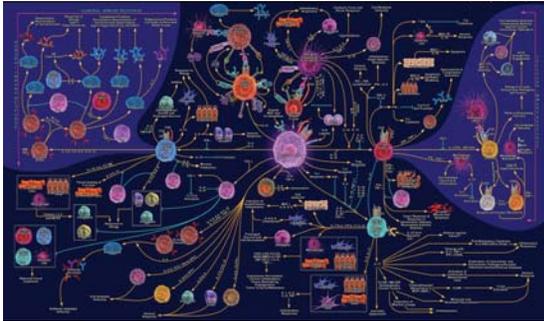
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## The Immune Response (abbreviated)



Taken from: <http://www.biologend.com/pathways/>

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## IMPLEMENTATION SCIENCE IS NOT NEW

- **Smith-Lever Act – 1914**
  - Agricultural research to public practice
- **Research Utilization – 1960s**
- **Knowledge to Action – 1980s**
- **Donabedian framework**
  - Quality improvement model – structure, process, outcome
- **Knowledge translation – 2004**

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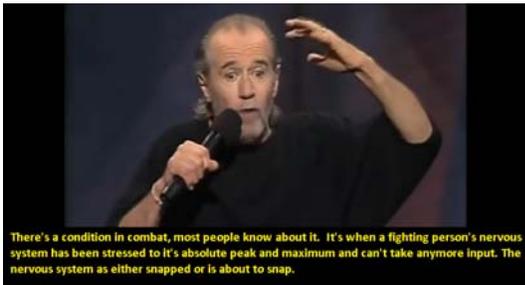
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## A LITTLE PERSPECTIVE...



There's a condition in combat, most people know about it. It's when a fighting person's nervous system has been stressed to its absolute peak and maximum and can't take anymore input. The nervous system as either snapped or is about to snap.

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## SHELL SHOCK



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## BATTLE FATIGUE



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## OPERATIONAL EXHAUSTION



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**POST-TRAUMATIC  
STRESS DISORDER**

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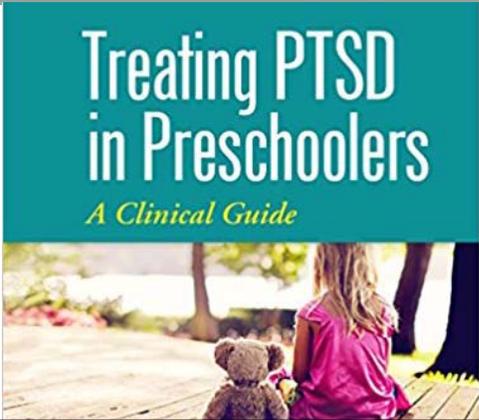
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**Treating PTSD  
in Preschoolers**  
*A Clinical Guide*

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**IMPLEMENTATION SCIENCE IS...**

**Scientific study of methods to promote the systematic uptake of research findings and other evidence-based practices into routine practice and to improve quality and effectiveness of health services.**

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**IMPLEMENTATION SCIENCE IS...**

Scientific study of methods to promote the systematic uptake of research findings and other evidence into routine practice and to improve quality and effectiveness of health services.

**Paper to Practice**

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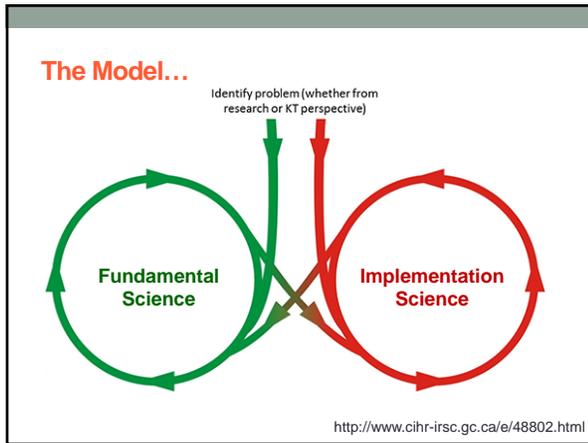
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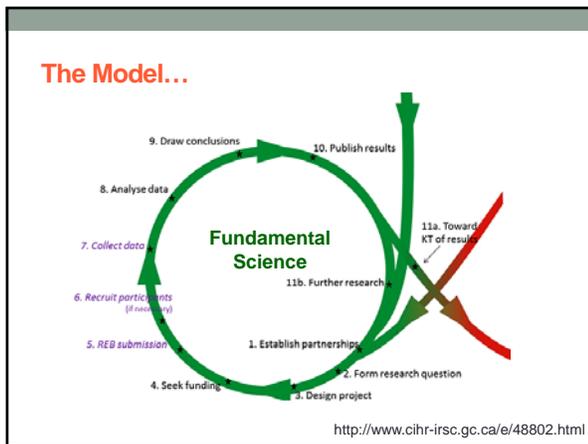
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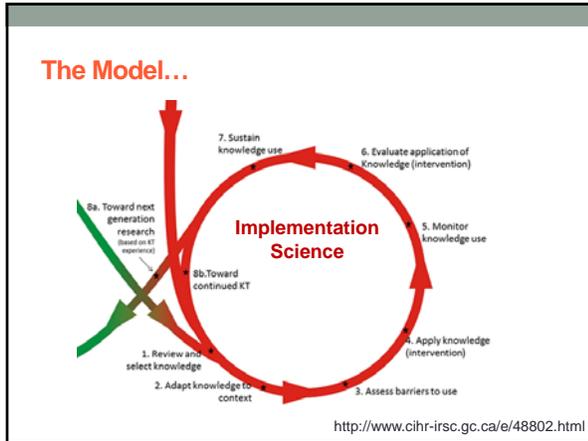
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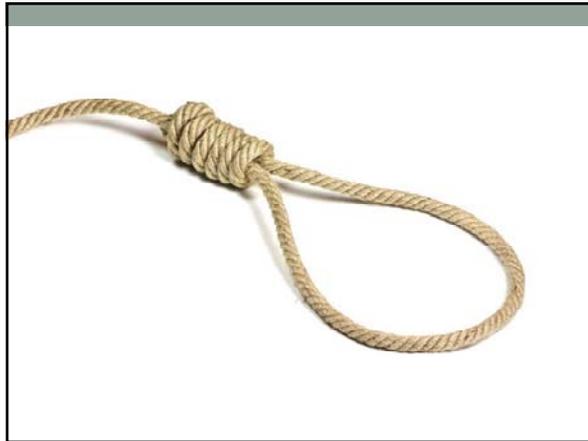
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**IMPLEMENTERS ARE LIKE HONEY BADGERS...**

- **Thick skinned**
  - No rattlesnake or wasp is going to get in their way
- **Incredibly focused**
  - Gets things done
- **Wide spanning reach**
  - Health, Economic, Managerial, Political
- **When it comes to your concerns...**

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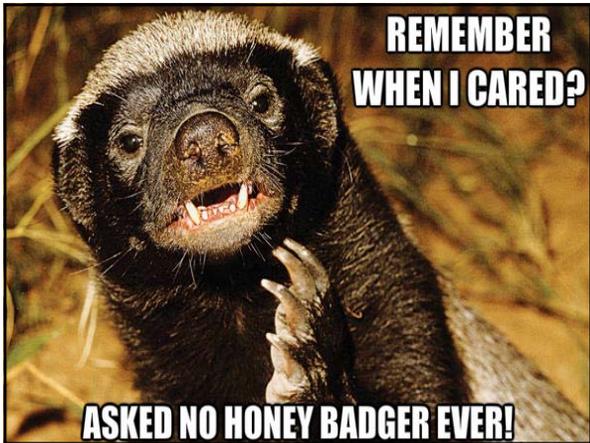
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**2014-2015 – A VERY BAD YEAR**

25 New Jersey	82	32	36	14	78	27	181	216	-35
26 Carolina	82	30	41	11	71	25	188	226	-38
27 Toronto	82	30	44	8	68	28	211	262	-51
28 Edmonton	82	24	44	14	62	19	198	283	-85
29 Arizona	82	24	50	8	56	19	170	272	-102
30 Buffalo	82	23	51	8	54	16	161	274	-113

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**IMPLEMENTING CHANGE!**

WELCOME TO TORONTO, MIKE.

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**THE END RESULT...**

27		Columbus	82	34	40	8	76	28	219	252	-33
28		Vancouver	82	31	38	13	75	26	191	243	-52
29		Edmonton	82	31	43	8	70	27	203	245	-42
30		Toronto	82	29	42	11	69	23	198	246	-48

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**THE END RESULT...**

27		Colu						219	252	-33
28		Van						191	243	-52
29		Edm						203	245	-42
30		Torc						198	246	-48

THERE'S ALWAYS NEXT YEAR

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## WHAT HAPPENED?

- **Rush decisions**
  - Expected outcomes were beyond capabilities
- **Money was thrown out but value lost**
  - GMs/coaches do not play for 60 minutes on the ice
- **The Cup was the goal, not a winning season**
  - But there's an 82 game season before that
- **End result was to be expected**
  - By Christmas, they were out.

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## NOT JUST THE LEAFS...



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## NOT JUST THE LEAFS...



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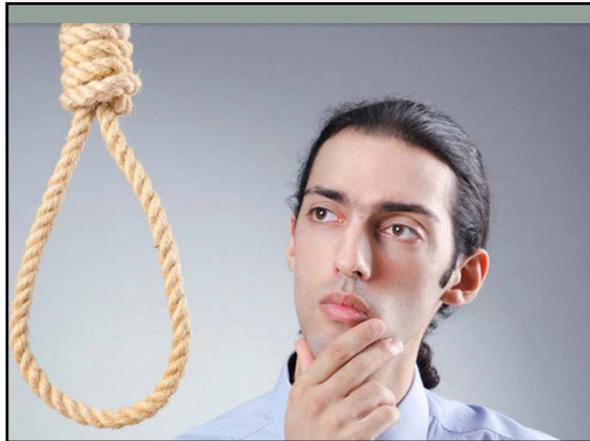
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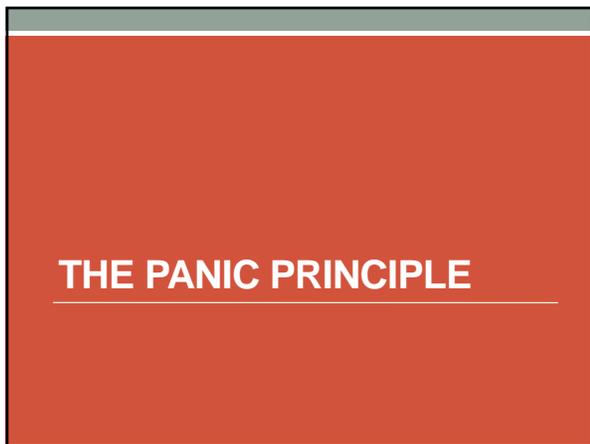
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**PUBLIC PANIC MANIFESTATIONS**



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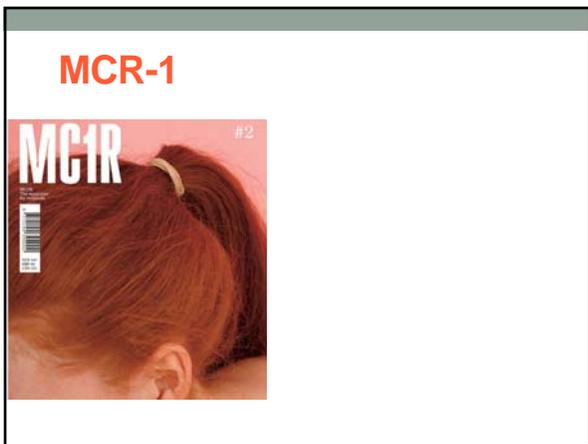
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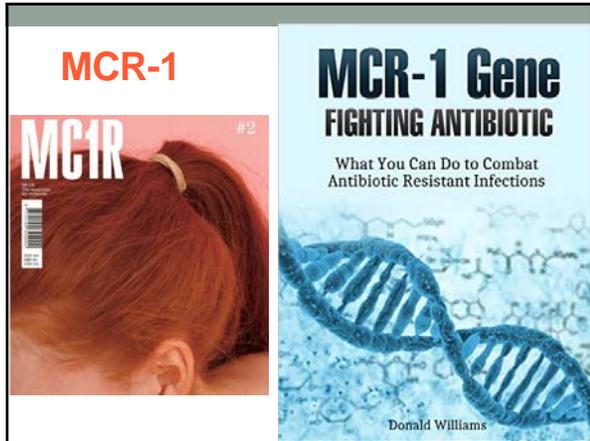
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**A MISINTERPRETATION MAELSTROM**

- **Plasmid-mediated colistin resistance**
  - Been around since the 1980s
  - Only discovered last year
- **Potential tipping point for a post-antibiotic era**
  - Resists antibiotic of last resort

**Media's Take...**

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**THE REALITY...**

- **Last resort**
  - It's the last antibiotic we would choose because of side effects
  - Missed in most of the media headlines
- **Mcr-1 is not an indicator of pan-resistance**
  - Many are still susceptible to regular antibiotics
  - Compound resistance with carbapenamase sparse
  - Some strains have lactamases as well
- **Discovery does add nail to coffin of antibiotics**
  - But this is by no means the end
  - Just have to add one more gene to surveillance

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**THE UNSTOPPABLE SURGE...**



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**ACADEMIC ANOMALIES**

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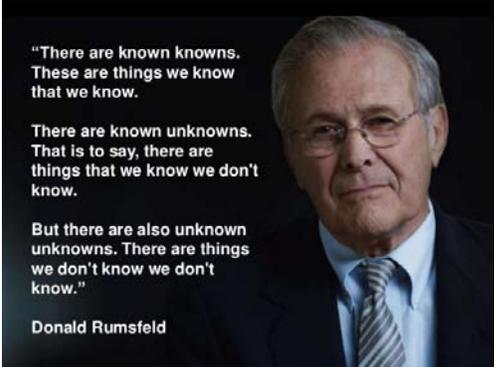
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“There are known knowns.  
These are things we know  
that we know.

There are known unknowns.  
That is to say, there are  
things that we know we don't  
know.

But there are also unknown  
unknowns. There are things  
we don't know we don't  
know.”

Donald Rumsfeld

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### DONALD RUMSFELD EFFECT

- **May seem funny at first glance**
  - Silly phrase from a untrustworthy man
- **Effective means to raise concern**
  - If we don't know...what do we do?
- **Opens the door to uninvited ideas**
  - Can change the landscape
  - Can also put significant pressure implementers
- **Very hard to control**
  - After all, it comes from academics, right?

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**SINKS STINK!**

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**Genomic Analysis of Hospital Plumbing Reveals Diverse Reservoir of Bacterial Plasmids Conferring Carbapenem Resistance**

Rebecca A. Wingard<sup>1</sup>, Ryan C. Johnson<sup>1</sup>, Sean Costan<sup>1</sup>, Amanda M. Ramsburg<sup>1</sup>, John P. Dekker<sup>1</sup>, Anna F. Lau<sup>1</sup>, Pavel Khil<sup>1</sup>, Robin T. Olson<sup>1</sup>, Clay Densing<sup>1</sup>, Morgan Park<sup>1</sup>, Pamela J. Thomas<sup>1</sup>, NISC Comparative Sequencing Program<sup>2</sup>, David K. Henderson<sup>2</sup>, Tara N. Palmer<sup>2</sup>, Julia A. Segre<sup>2</sup>, Karen M. Frank<sup>2</sup>

Robert A. Bonomo, Editor

mBio vol. 9 no. 1 e02011-17 - doi:10.1128/mBio.02011-17

**A** Nov 2010 - Feb 2011 ECNH5 Patient Y  
282.4  
43.6

**B** Nov 2011 - Jan 2012 KPNH27 Patient A  
268.3

**C** Jan 2012 ECNH2  
KPNH27  
HDT  
ECNH2  
47.3  
282.4  
320.0  
pKPC-272  
pKPC-91  
pKPC-296

● KPC3 Tn4401b ● KPC2 IS26-TnpA

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## Are Sinks Causing Infection?

- **No correlation between patients and organisms or carbapenemase genes**
- **Wastewater contains resistance plasmids**
  - **Not just from hospitals**
- **"...cannot be used as a marker of patient colonization status."**
  - **Surveillance is good**
  - **No need to throw out the sinks**

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## THE PURSUIT OF PAPILLOMIACIDES

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**WHAT'S THE PROBLEM?**

High Risk HPV Contamination of Endocavity Vaginal Ultrasound Probes: An Underestimated Route of Nosocomial Infection?

Jean-sebastien Casalegno<sup>1</sup>, Karine Le Bail Caval, Daniel Eibach, Marie-Laure Valdeyron, Gery Lambin, Hervé Jacquemoud, Georges Mellet, Bruno Lima, Pascal Gaucherand, Patrice Mathevet, Yahia Mekki<sup>2</sup>

**Transvaginal ultrasound probe contamination by the human papillomavirus in the emergency department**

Shuk Ting Christine Ma,<sup>1</sup> A C Yeung,<sup>2</sup> Paul Kay Sheung Chan,<sup>2</sup> Colin A Graham<sup>1</sup>

**Persistence of Microbial Contamination on Transvaginal Ultrasound Probes despite Low-Level Disinfection Procedure**

Fatima M'Zali<sup>1</sup>, Carole Bounizra<sup>1</sup>, Sandrine Leroy<sup>2</sup>, Yahia Mekki<sup>1</sup>, Claudine Quentin-Noory<sup>1</sup>, Michal Kann<sup>1</sup>

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**IS THIS A REASON TO PANIC?**

Human Papilloma Virus –  
The New Challenge For Infection Prevention

**PREVENTING HPV TRANSMISSION IN THE HEALTHCARE SETTING**

Appropriate reprocessing of ultrasound probes between patients is critical to reduce the risk of human papilloma virus (HPV) transmission. Recent research shows disinfectants commonly used on ultrasound probes do not kill natural, infectious high-risk HPV.

Given the prevalence of HPV, the potential for HPV transmission in the healthcare setting, and the stark risks for cancer, these latest research developments are a major concern.

The highest DPE is the first high-level disinfection system proven to kill natural, infectious, high-risk HPV in laboratory testing, using the manufacturer's FCN-based conditions. For more information, visit [www.hpvdisinfection.com](http://www.hpvdisinfection.com).

**COMMONLY USED DISINFECTANTS DO NOT KILL HIGH-RISK HPV**

Due to the difficulties of producing natural, infectious HPV for research, disinfectant efficacy testing against HPV has not previously been possible. This changed recently when the world's first method to produce sufficient infectious HPV for research was developed, and the first HPV disinfectant efficacy study was published in 2014.<sup>1</sup>

This study proved that low disinfectants commonly used for high-level disinfection (HLD) in medical and healthcare facilities, glutaraldehyde and ortho-phthalaldehyde (OPA), do not kill natural, infectious, high-risk HPV – even after 24 hours of contact time!




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**PROBABLY NOT...**

- **HPV Biology**
  - Non-enveloped DNA virus
  - Similar to poliovirus
- **HPV was tested in 2014**
  - Myers et al. J Antimicrob Chemother. 2014 Jun;69(6):1546-50
  - Not surprisingly resisted certain antimicrobials
- **A panic situation?**
  - The failing disinfectants also fail against poliovirus
  - Disinfectants known to kill polio...not included
- **The Rumsfeld Effect?**
  - Doesn't apply in this case
  - There are no unknowns
  - A matter of assessing risk vs system change

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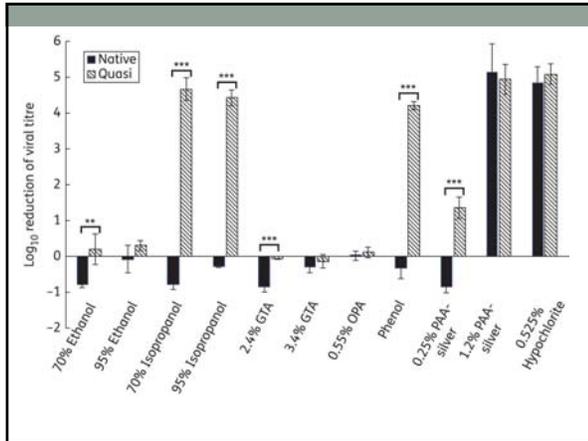
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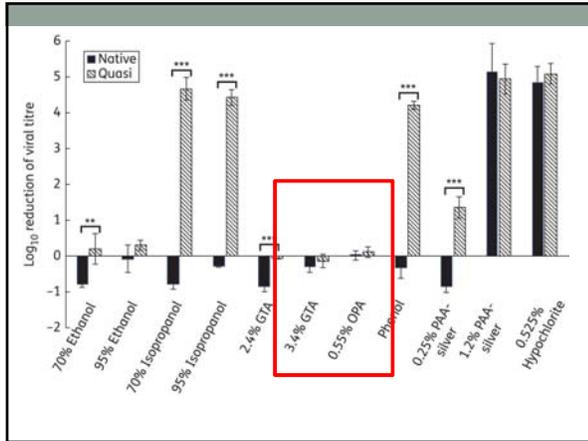
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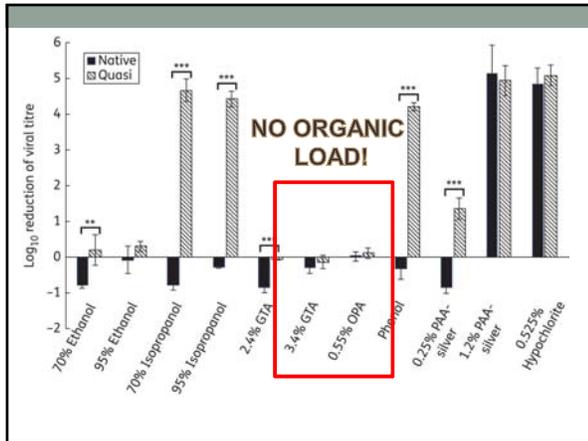
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# SHINY OBJECT SYNDROME

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## MICROFIBRE MALEFICENCE

The diagram shows a green starburst representing a Microfiber and a blue circle representing a Cotton Fiber. An arrow labeled "direction of fibers" points from the Microfiber towards the Cotton Fiber. Text above the arrow says "water, soap, dirt, dust, grime". Below the Microfiber is the text "no residue Microfiber" and below the Cotton Fiber is "residue Cotton Fiber".

- **A better textile for cleaning**
  - Cloth was not particularly effective
- **Impressive in removing microbes from surfaces**
  - Excellent decontamination tool
- **Even reduced the spread of *C. difficile***
  - Just wipe and it's gone!
- **But there is a catch...**
  - Did you catch it?

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**DECONTAMINATION VS KILL**

- **The goal of disinfection is to kill pathogens**
  - Decontamination is a nice word for removal
- **Studies veered away from kill**
  - Not particularly helpful in the grand scheme
- **Without kill, cross-contamination is likely**
  - Can make the situation worse
- **Microfibre is also harder to clean**
  - High surface area requires specific laundering
  - Can be highly costly to a healthcare facility

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**THE DISINFECTION DILEMMA**



- **Guidelines exist for kill**
  - Standard tests in place
  - Does a product meet the criteria?
- **The results can then be used to promote a product**
  - Who can resist a 99.99% reduction
- **We are always looking for that <0.01 p value as well**
  - It's the benchmark of statistical significance
- **But how exactly did these results come to be?**
  - What were the methods
  - Are they relevant?

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**WHICH TEST IS RIGHT FOR YOU?**

- **Suspension Test**
  - Good for soaking
- **Carrier Test**
  - Realistic for surface disinfection
  - Contact time is important!
- **Wipe Test**
  - Mimics routine disinfection
  - Known as ASTM E2967
  - Also, the Wiperator Test
- **Need to match methods**
  - If not, the data can lead to choose an inappropriate method

New ASTM Standard Tests for Decontamination Abilities of Disinfectant Towelettes  
A new ASTM International standard details the procedures for testing pre-wetted towelettes with a mechanical device called "the wiperator".  
Manufacturers would use the standard (soon to be available as E2967, Test Method for Assessing the Ability of Pre-Wetted Towelettes to Remove and Transfer Bacterial Contaminant on Hard, Non-Porous Environmental Surfaces Using the Wiperator) to test towelettes for their ability to decontaminate surfaces like sink splashes.

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**EVIDENCE IS NOT GOSPEL**

- Evidence is foundation for implementation science
  - Good evidence will support good practice
- But understanding the evidence is far more important
  - Trust but verify does not apply
  - Do the work to ensure the information is valid & appropriate
- How many have asked for tests to kill:
  - H1N1 pandemic flu – any influenza
  - SARS coronavirus – any coronavirus
  - HPV - poliovirus
  - Ebola & Zika – enveloped viruses

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**CAN WE LOOSEN THE GRIP?**

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**UTOPIAN SUNSHINE VS FOUCAULDIAN GLOOM**

- Implementation Science is not a natural concept
  - Requires the merger of distinctly populations
  - A challenge to say the least
- Learning To Trust and Trusting To Learn
  - Coopey J. Management Learning. 1998;29:365-382
  - Merging different hierarchical societies is a major problem
  - Need to incorporate all stakeholders
- Requires a different perspective
  - Temper technocracy
  - Employ Experience
  - Digest Differences

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**4ES FOR IMPLEMENTATION SCIENCE**

**EDUCATION**

**ENGAGEMENT**

**ENACTMENT**

**EVALUATION**

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**EDUCATION**

- **The foundation for all Implementation**
  - Without knowledge, there can be no change
- **Using literature to develop plans of action**
  - Vast amount of information available
- **Not only scientific**
  - Economic
  - Behavioural
  - Perception



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**KNOW YOUR TOOLS...**

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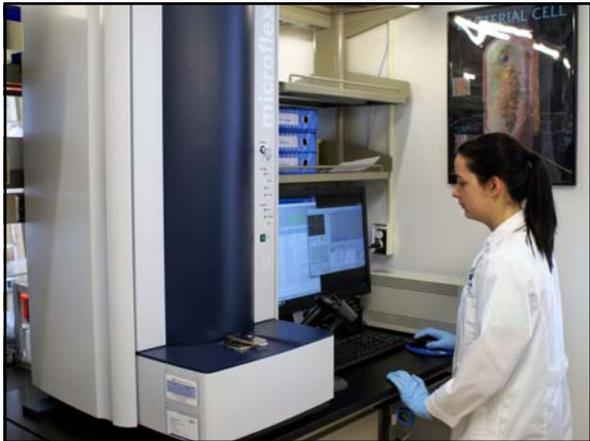
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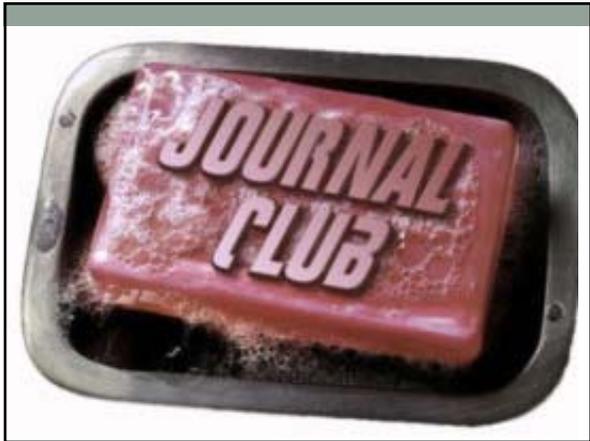
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**ENGAGEMENT**

- **After education in place, time to reach out**
  - Involve stakeholders...all of them.
- **Share the aims**
  - The pitch is always the most important part
  - With 'buy-in' you can move forward
- **Be Honest and Realistic**
  - Don't go overboard when pitching ideas
- **Form alliances**
  - Carefully...

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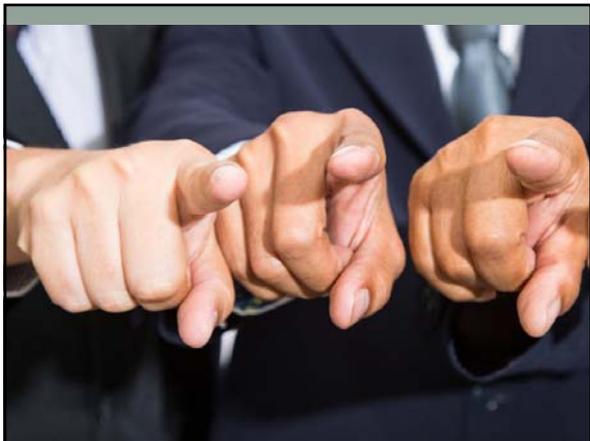
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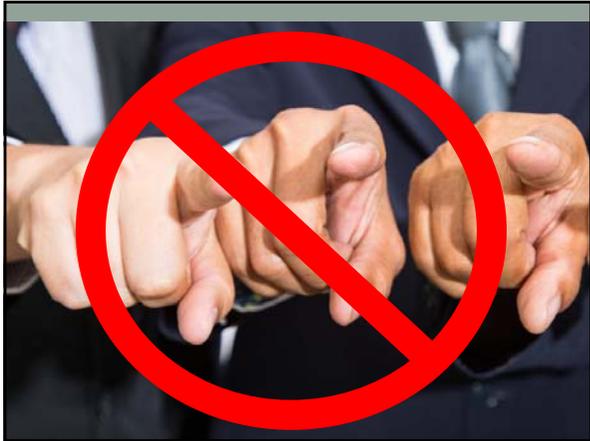
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**DEMOCRATIZATION**

- Remember to consider all possible stakeholders
  - Groups may be missed in the process
  - Could lead to unnecessary troubles
- Be Universal
  - Diversity is a critical need
  - Have as many voices as possible from the start
- Behaviour is critical in this case
  - Need to figure out how people will react
  - Resistance? Acceptance? All out war?
  - Have to be ready to mediate these issues

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# Jason Tetro Presentation for PICNet 2018 Educational Conference



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**BRING BACK BABYLON**

- **Speak different 'languages'**
  - Scientific
  - Economic
  - Management
  - Policy
- **Need to bring these languages together**
  - Not only 'translation'
  - Also a matter of context
  - Find a common denominator for all
- **Answer has been known for centuries**

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**THE GRADE 8 PRINCIPLE**

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**HOW NOT TO ENGAGE APPOPRIATELY**

- **Antibiotic stewardship in the UK**
  - Necessary to prevent post-antibiotic era
- **Did anyone tell the public?**
  - Decisions were made on a panic basis
  - Public seemed to be excluded from this process
- **The lack of inclusion has had a major setback**
  - A sense of fear in the public
  - A sense of worry amid health officials
  - Issues on the front lines and behind closed doors

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**THE PRESCRIPTION PARADOX**

- **Back in the 1990s, perception studies performed**
  - Majority of public expected a prescription
  - Did not jive with stewardship
- **With stewardship, patient satisfaction dropped**
  - Was a unidirectional decision on part of healthcare
  - Public engagement was a pain – they will eventually 'get it'
- **Apparently they haven't...yet**
  - Ashworth et al. Br J Gen Pract. 2015. eletter
  - Lower satisfaction with fewer antibiotic prescriptions
  - Royal College of General Practitioners responded

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**FROM THE RCGP STATEMENT**

“It’s concerning that patients associate a prescription for antibiotics with a satisfactory visit to their GP, particularly as we know that in many cases antibiotics are not appropriate forms of treatment and could actually do more harm than good, so it may be better not to prescribe.”

“It’s also frustrating that GP practices that are working hard to reduce inappropriate antibiotics prescribing in order to prevent diseases becoming resistant to them face falling patient satisfaction ratings. It truly is a case of being damned if we do and damned if we don’t.”

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**Engagement Matters!**

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Isolation  
Precautions for  
Visitors



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**A GUIDE FOR EVERYONE**

- **Applicable to...**
  - HCWs
  - Patients, Clients, Residents
  - Visitors
- **Hand hygiene made available in high traffic areas**
  - Everyone has access
- **Education used for every visit**
  - Continued messaging
- **Everyone plays by the same rules**
  - True democratized implementation

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**ENACTMENT**

- Execution may seem like the best stage
  - It quite possibly can be the worst
- Always have the experts on hand...
  - May be more than one person
- Determine pitfalls and hurdles quickly
  - Can save significant troubles
- Rehearse, rehearse, rehearse!
  - Go through all the motions

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### BUNDLE TO PREVENT BUNGLES

- A fascinating concept in implementation science
  - Has represented a turnaround in many areas
  - Particularly infection prevention and control
- Involves 'bundling' already known practices into one
  - Creates a checklist of what works
- Has been around for over 10 years
  - Ventilator-associated pneumonia
  - Central line-associated bloodstream infections
  - Disinfection and antiseptics

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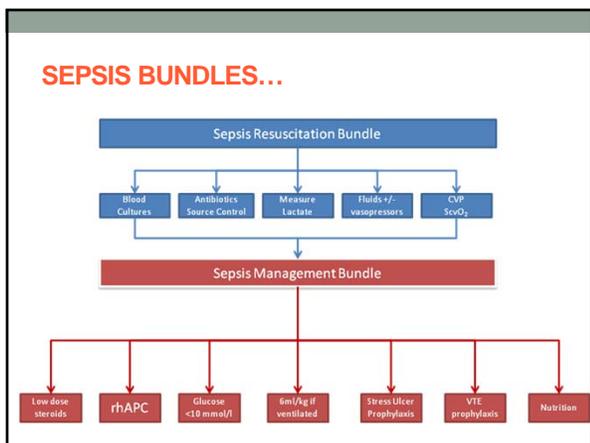
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## ONE STEP-WEDGE AT A TIME

- **Step-wedge approach**
  - A form of sequential trial
  - Small groups within a larger group experience intervention
  - Continues over time until full implementation
- **Excellent method for enactment**
  - Can be performed in any context within healthcare
  - Provides exceptional data for analysis
  - Can be stopped at any time with minimal consequences
  - More: Brown and Lilford. BMC Res Methodol. 2006;6:54
- **Can be incorporated with bundles**
  - Provide a larger picture comprise of very small steps

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**EVALUATION**

- **Academic**
  - Publication and Conferences
- **Quality-Based**
  - Equating implementation with improvement
- **Public**
  - Increasingly necessary
  - Social interaction a must
- **Need to find harmony among all three**
  - Congruence in conclusions

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**SUMMARY**

- **Implementation Science is complex**
  - Takes time and effort to get it right
  - Needs a calm approach
  - Cannot take shortcuts
- **Can bring out the best...and the worst**
  - Rushing will only lead to mistakes
  - Need to understand evidence completely
  - Always keep in mind perspective
- **Work to achieve a common goal**
  - Democratize the process & everyone can share the success

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## A Unique Perspective



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## Learning To Love Germs

- **Bold and seemingly impossible task**
  - Reversal of a century-long war on germs
- **Was tasked with this in 2011**
  - Write books that highlight our relationship with microbes
  - Find a way to change perspectives
  - From War to Peace and possibly harmony
- **Stakeholders:**
  - Implementer: Publisher – Penguin Random House
  - Targets: General Public and Academics
  - Interventionist: Me

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## Learning From Evaluation

- **The Germ Code**
  - Written in a narrative style
  - Education based on historical references
  - Engagement with public and academia
  - Execution in a narrative style based on Woody Allen
- **Outcomes Not Quite As Expected**
  - Had some interest in the public
  - Academics found it intriguing and outside the box
  - Short listed for science book of the year
  - Invitations to give lectures across the globe
- **Did it change perspectives?**
  - Not at all
  - Germs were still regarded as enemies
  - This was a nice book but was not about to change minds

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**Finding A New Path**

- **Took a year to find the right fit**
  - Went through many different styles
  - Significant challenge
- **Education**
  - Needed to be more public
  - Required new concept in writing
  - Start with mini-review for peer-reviewed journals
  - Remove unnecessary aspects (jargon, Latin names, etc)
  - From 1,500 words to as little as 150
- **From Narrative To Active**
  - Instead of movie, concept album
  - Take the individual on a personal journey
  - Every day account of our lives...with germs

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**The Germ Files**

- **Divided into 10 'tracks' applicable to every day life**
  - Hygiene, health, diet, childcare, sex, environment
  - Each 'track' reveals how germs interact with us
  - Scientifically accurate and yet Grade 8 Level
- **Evaluation**
  - National bestseller in Canada
  - Public praised the book
  - Academics loved the way science is communicated
  - People began to actually want to learn more about germs
  - Some even wanted to learn how to love them
  - People were even calling themselves Germ Philes

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**Next Steps?**

- **Based on Evaluation, method works**
  - Goals were achieved
- **Will this mean a third book?**
  - Who knows...all up to the implementers
  - Indications suggest yes but never know
- **The Problem With Evaluations**
  - Can show success
  - Can reveal the best path forward
  - But cannot predict the future
- **Need to be sure all stakeholders are happy**
  - This is never easy
  - But publishing is not healthcare
  - Implementers can be addressed

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