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**BACKGROUND**

- Dabbling in checklists
- (Not so much) fun in SIM at Wellington
- No complete/up to date manual at Hutt
- Foolish volunteer

**PACU Handovers**  
Apply to all PACU, ORCA, and Emergency

- Name & Operation
- PMH
- Drugs & Allergies
- Anaesthetic Technique
- Airway Issues
- Intra-op Course/Problems
- Blood Loss
- Fluids & Urine Output
- Analgesia
- Anti-emetics
- PACU Plan incl. BP & SpO<sub>2</sub>
- Anything else...

2

Maternal arrest: 14 differentials  
Hypoxia: 27 differentials

- SIM - never seen the CCDHB manual used there
- ED SIM easier - more regular, practised
- Anaesthetics - complex issues,

**HISTORY OF CHECKLISTS**

- Introduced in anaesthesia first in 1980's
- Vitals = a checklist
- Improvement in:
  - CLAB
  - Ventilator management
  - End of life care
- But do they work in an emergency?

3

Maverick flight pilots in 1970-80s aviation...

**WHAT IS THE POINT?**

- Cognitive aid/Manual/checklist = same
- Crises are rare (145/10,000 operations)
- Failure to adhere to critical management steps is common
- Human's are unreliable - especially under stress:
  - recall
  - critical decision making
  - task fixation
- All other major safety focused industries have accepted this. Why haven't we?

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**CHECKLIST FATIGUE**

- This is a culture problem
- Gawande WHO Surgical checklist work:
  - Researchers regularly thrown out of theatre
  - Despite significant improvement in morbidity & mortality
  - 20% of people did not like using the checklist
  - 93% would want it to be used on them!!

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Any complication: 11% to 7%  
Death 1.5 to 0.8%

## CHECKLISTS IN ACTION



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## PROOF



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### Cardiac arrest in the OR: How are our ACLS skills?

Can J Anaesth 1998; 45: 7, pp 180-85  
 Matt M. Rankin, MD,  
 J. Hugh Davis, MD, MSc,\*  
 Marsha Cohen, MD, FCCP,††

- High fidelity simulation
- Anaesthetists of varying seniority
- 89 subjects each given a scenario

|                              | ACLS trained<br>(n = 62) | non ACLS trained<br>(n = 27) |
|------------------------------|--------------------------|------------------------------|
| strict adherence (score = A) | 8 (13%)                  | 0 (0%)                       |
| minor deviations (score = B) | 22 (35%)                 | 5 (19%)                      |
| major deviations (score = C) | 32 (52%)                 | 22 (81%)                     |

- Worse in people not trained in ACLS
- 6% never even used the defibrillator

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(Can J Anaesthesia 1998)  
 An example of the unreliability of humans - not a checklist survey

Minor = changes in energy levels, drug doses, Rx order  
 Major = failure to stop anaesthetic, no defib, no adrenaline

### ORIGINAL SCIENTIFIC ARTICLES

#### Critical Checklists for the Operating Room: Development and Pilot Testing

John E. Zornes, MD, MSc, Alexander F. Arango, MD, MSc, Angela M. Burke, MD, MSc, William B. Berry, MD, MSc, Elizabeth Edinger-Gibson, MD, Judith M. Wang, MD, Susan R. Lippman, MD, David J. Hagan, MD, Sarah Davis, MD, Susan Nelson, MD, David J. Rowland, MD, Douglas F. Sasaki, MD, MSc, Stanley W. Adkins, MD, MSc, Neil A. Canadian, MD, MSc, MD, PhD

- Small study incl 2 teams exposed to 8 sims
- Developed their own checklist
- Video review of adherence to critical tasks
- Use of checklist =
  - x6 reduction in adherence failure (11/46 to 2/46)
  - adjusted relative risk of failure = 0.15 (CI: 0.04-0.6, p=0.007)
- Participants would want checklists available in a real crisis

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Journal American College of Surgeons 2011

46 processes measured against incl MH, tachycardia, haemorrhage, VF/VT, brady, air embolism, anaphylaxis

### EDITORIAL

#### It is Time to Use Checklists for Anesthesia Emergencies Simulation is the Vehicle for Testing and Learning

Kevin C. Nadeau, MD, MPH,† and Jeffrey A. Cronin, PhD,††  
 Anesthesiology and Pain Medicine \* and School of Nursing †, University of Toronto, Ontario, Canada

- Comment on checklist in LAST research:
  - No checklist = 8/21 tasks
  - Checklist = 16/21 tasks
  - No trainee asked for checklist despite being informed of best practise to use one
- Conclude a major culture problem

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Regional Anaesthesia & Pain Medicine 2012

### Use of Cognitive Aids in a Simulated Anesthetic Crisis

T. Kyle Harrison, MD  
Tanja Manser, PhD  
Steven K. Howard, MD  
David M. Gabu, MD

We evaluated empirically the use of a cognitive aid during a high-fidelity simulation of a simulated adult MI scenario. 24 involving CA 1 and 24 involving CA 2 residents. In the CA 1 group, 19 of the 24 teams (79%) used a cognitive aid, in only 8 of the 19 teams used it frequently or extensively. In the CA 2 group, of the 23 teams (78%) used a cognitive aid but only 6 of them used it frequently or extensively. The frequency of cognitive aid use correlated significantly with

- 48 simulations

Noted specifically that teams which read instructions out loud with members responding to tasks scored the highest

11 (Anaesthesia & Analgesia 2006)  
No instructions or pre-training on what or how to use checklist  
Max score = 25  
Different tasks got different points  
Frequency of use = 1 - minimal use; 5 = extensive use

### Simulation-Based Trial of Surgical-Crisis Checklists

Alexander F. Anagha, M.D., M.P.H., M.D., Angela M. Baker, M.D., M.P.H., Justin M. Wang, M.D., M.P.H., Stuart R. Lipsitz, Sc.D., William R. Kohn, M.D., M.P.H., M.P.A., David L. Stevens, M.D., M.P.H., David L. Hyman, M.D., Daniel J. Borum, B.S., Charles N. Palmer, M.D., Douglas S. Stone, M.D., M.P.H., and Richard A. Goepfert, M.D., M.P.H.

- Multi centre team based simulation
- Each randomly assigned to manage 50% crises with checklists
- 17 teams participated in 106 crises
  - With checklist = 6% steps missed
  - Without checklist = 23% steps missed
- [RR 0.28 (CI 0.18-0.42)]
- 97% of participants wanted a checklist present when they were operating

| Scenario Type*   | Failure Rate†     |                   | P Value‡ |
|--|-------------------|-------------------|----------|
|  | With Checklist    | Without Checklist |          |
|  | no./total no. (%) | no./total no. (%) |          |
| ACLS scenario  | 7/288 (2)         | 33/389 (8)        | 0.002    |
| ACLS scenario preceded by hemodynamically unstable condition | 14/154 (9)        | 46/172 (27)       | <0.001   |
| Other crisis scenario  | 1/117 (1)         | 28/118 (24)       | 0.002    |

12 (NEJM 2013)  
air embolism, anaphylaxis, cardiac arrest, haemorrhage & VF, MH, unexplained hypotension, hypoxia, bradycardia, tachycardia

### CHECKLISTS IN ACTION

13 elaine bromley

### HOW TO USE A CHECKLIST

- Impossible to write the 'perfect checklist'
- 2 major types:
  - Read ⇒ Do
  - Do ⇒ Check
- Read it yourself
- Use a 'reader'

14 Boeing/Airbus have people employed whose sole job is to update & improve these  
Shutting down the wrong engine = checklist design failure

### THE POWER OF A READER

- Why are people are reluctant to use aids in a crisis?
  - Culture & Ego
  - Picking up an unfamiliar document in a crisis might just add confusion
  - Human multi-tasking ..... it is dogma!
    - Decreased situational awareness
    - Decreased communication
- A reader .... solved

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**Does Every Code Need a "Reader?" Improvement of Rare Event Management With a Cognitive Aid "Reader" During a Simulated Emergency**  
A Pilot Study [Sim Healthcare 7:1-9, 2012]

- 31 physicians observed during SIM of obstetric cardiac arrest & MH
- 22% - 33% used the cognitive aid prior to reader introduction
- Nurse or Medical student reader

**Maternal arrest:                      MH:**

| Critical Action           | Before Reader % Performance |                            | P      | Critical Action*                       | Before Reader % Performance |                            | P     |
|---------------------------|-----------------------------|----------------------------|--------|--|-----------------------------|----------------------------|-------|
|                           | Before Reader % Performance | After Reader % Performance |        |  | Before Reader % Performance | After Reader % Performance |       |
| Call for help             | 81                          | 100                        | 0.03   | Discontinuation of volatile anesthetic | 88                          | 100                        | 0.31  |
| Correct hypoxemia         | 72                          | 100                        | <0.01  | Correct dantrolene dosage              | 44                          | 100                        | 0.01  |
| CPB                       | 81                          | 100                        | 0.03   | Correct dantrolene mix                 | 33                          | 100                        | <0.01 |
| Left uterine displacement | 18                          | 100                        | <0.001 | Second dosage of dantrolene            | 77                          | 100                        | 0.14  |
| Simulation                | 54                          | 100                        | <0.001 | Provision of cooling measures          | 66                          | 100                        | 0.06  |
| Hysteroscopy              | 22                          | 100                        | <0.001 | Provision of high flow oxygen          | 55                          | 100                        | 0.02  |

16                      22-31% in maternal arrest  
33% in Mh crisis used reader

Resident physicians, 1 month on the floor, lectured on CRM, ACLS trained

AN only for MH scenario. Maternal collapse incl O&G

**Does Every Code Need a "Reader?" Improvement of Rare Event Management With a Cognitive Aid "Reader" During a Simulated Emergency**  
A Pilot Study [Sim Healthcare 7:1-9, 2012]

- Communication flow:

17                      L = leader  
T = team  
R = reader

10min random video clip analysis  
CRITICAL INFO & ACTION TRANSFERS

- Pre-reader - didn't break out people

**Does Every Code Need a "Reader?" Improvement of Rare Event Management With a Cognitive Aid "Reader" During a Simulated Emergency**  
A Pilot Study [Sim Healthcare 7:1-9, 2012]

- Survey - Those who **didn't** use the aid:
  - 33% - Thought it would be too hard to use themselves
  - 16% - Use of aid is not appropriate in a crisis
  - 29% - Thought didn't have time to stop working & use it
- Survey - Those that **did** use the aid (without a reader):
  - 77% - Found using the aid distracting
  - 22% - Found it hard to start communicating after reading

18                      L = leader  
T = team  
R = reader

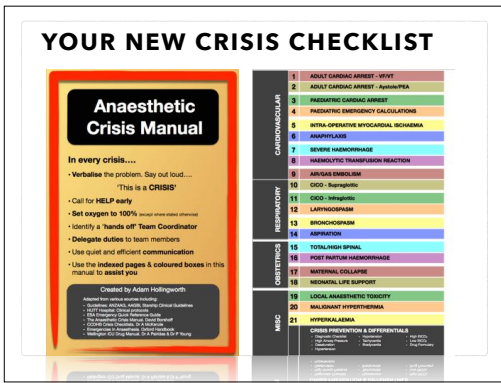
10min random video clip analysis  
CRITICAL INFO & ACTION TRANSFERS

**CHECKLISTS IN ACTION**

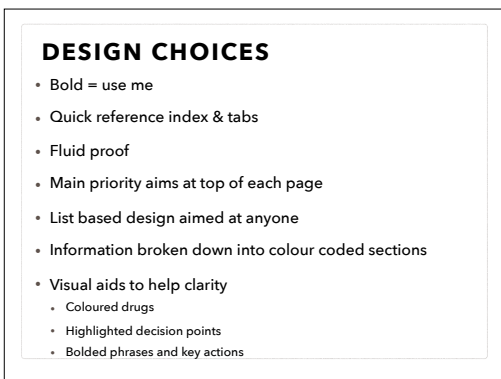
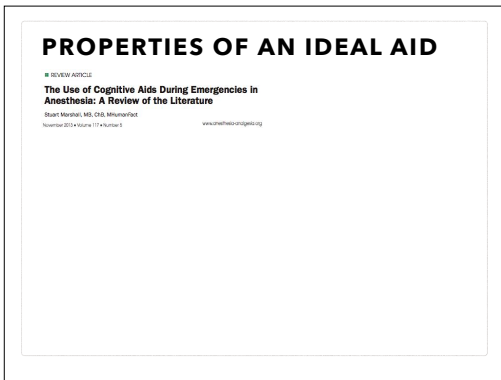
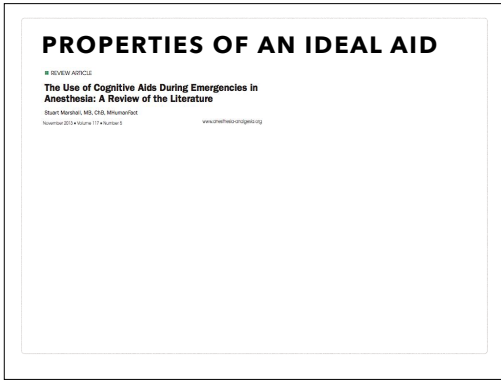
19                      Burg Khalifa 829.8m since 2009 in Dubai

**DESIGN OF YOUR MANUAL**

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(Anaesthesia & Analgesia 2013)  
assist other team members = infusion instructions!!!!



## CONTENT CHOICES

- Instructions on best use at front
- Category headings are based on previously published works
- Localised & updated from many sources
- Keeping it simple
- 2 sections - one for known problems, one to help diagnose
- Paeds pre-calculations page & actually useful drug formulary
- Drug doses pre-calculated to 70kg adult
- Infusions presented with instructions on how to make up & rate to start

24

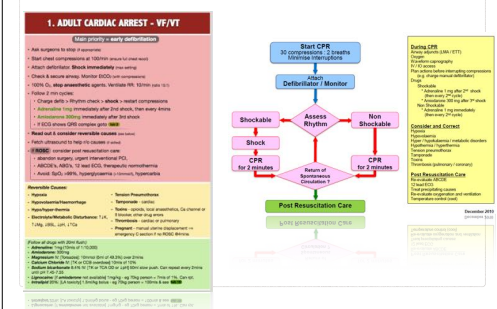
Calling for help, 100% O2 is not on every page...feedback!?!?

## WHY NOT REPRODUCE ALGORITHMS?

- Not designed to be used in an emergency
- Not in a familiar consistent format
- Not 'lay person' reader friendly
- Visually busy - need cerebral effort to work out which fork to take
- Not localised to Anaesthesia
- Not localised to our theatre setup

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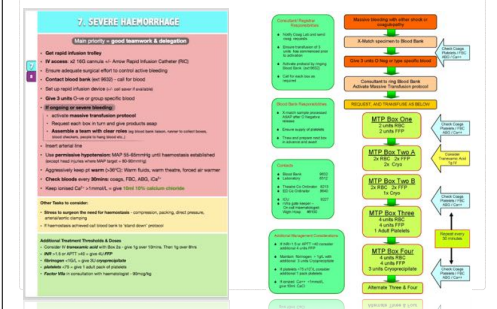
## VERSUS



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- Use of reader - is the algorithm as easy to use in a crisis OR is it a reference document
- More information eg speed of compressions, REVERSIBLE CAUSES, drug doses!
- Localised to us - stop gases, ventilate at a different rate (as airway

## VERSUS



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- Lack of clear flow in Hutt protocol - esp for a reader!!!!
- Too much unimportant information in MTP protocol
- Lacks surgery specific stuff eg permissive hypotension, good access, rapid transfusion setup, aggressive warmth

## INTENDED USE

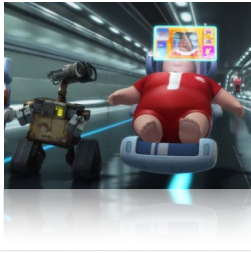
- Implementation problems
- Culture change
- Ideal = the 'Reader' becomes a vital member of the team
- Flexibility:
  - Use a reader
  - Read ⇒ do
  - Do ⇒ check
  - Self education during down time
  - Education of others

28

- Not a dictatorship - not enforceable.
- The project has failed if it's not used
- I hope to have planted the seed but you must make the flower grow
- Passionate about patient safety but because crises are rare it's difficult to prove it's worth.

### THE FUTURE

- Your feedback
- Roll out & final print
- Manual in each theatre (??one in delivery suite)
- Familiarisation
- Practise - ?in SIM
- Evolution & improvement
- Improving patient safety



### HOME



- On the side of the anaesthetic cart

### SUGGESTIONS & GOOD IDEAS

- It is your manual - please help improve it:
  - Design and layout
  - General comments
  - Individual Pages



### HOW TO START A MOVEMENT



### HOW TO START A MOVEMENT



