

Principles

1. Human error does not **cause** problems
 2. When something fails, **every** defence has failed
 3. Human error is the **symptom** of poor design
 4. Poor design is the **symptom** of human error
 5. Human error is **incoherent** as a concept
- 5+1. We are humans —
We **cannot** understand human error



Reports that say that something hasn't happened are always interesting to me, because there are known knowns; there are things we know we know.

We also know there are known unknowns: we know there are some things we do not know. But there are also unknown unknowns – the ones we don't know we don't know. They tend to be the difficult ones.



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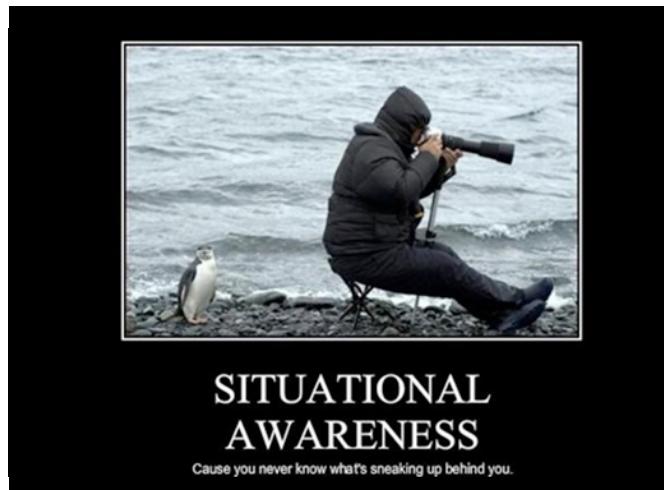
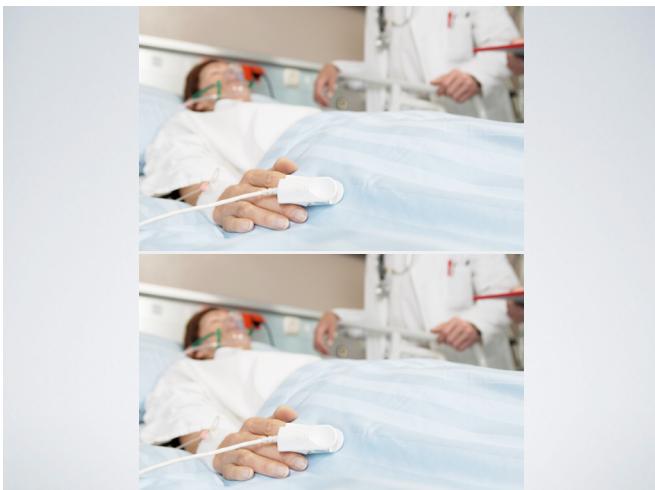
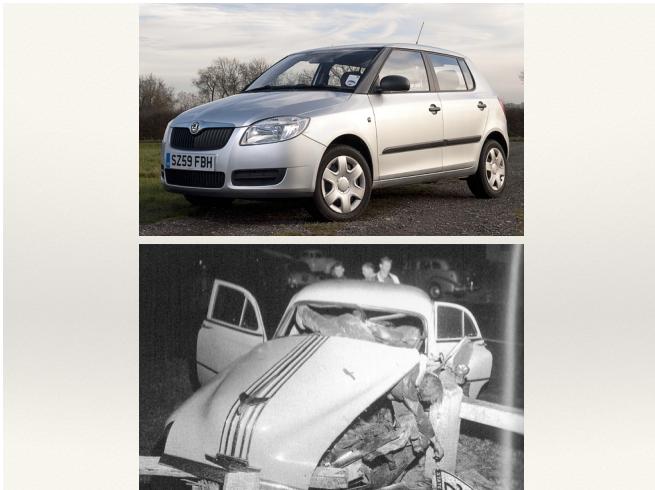


Rumsfeld's unknown known

1. Known knowns —
things we know we know
2. Known unknowns —
we know there are things we don't know
3. Unknown unknowns —
we don't know we don't know some things
4. Unknown knowns —
we don't know things other people know

$$2^2 > 3$$

unknown unknown known





Aruba
ClearPass Guest

X Access denied(null)

Please login to the network using your guest username and password received from the local IT department.

If you only need 7 days access, you can make your own account just clicking the "Create guest account" at the bottom of this page

Simulate Guest network

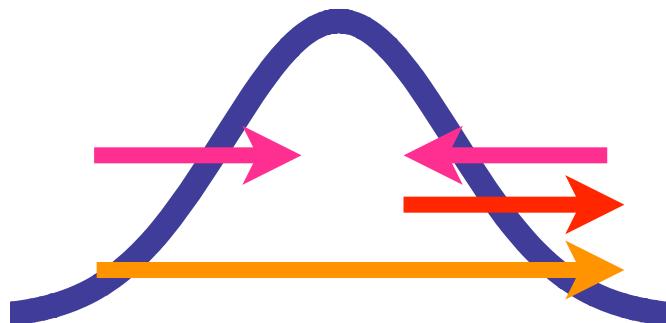
Username:
Password:

Log In

Contact local IT department if you are experiencing difficulty logging in.

Create guest account

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[https://guest.arubanorguest/guest_login_simula.php?termmsg=Access%20denied\(null\)&_browser=1](https://guest.arubanorguest/guest_login_simula.php?termmsg=Access%20denied(null)&_browser=1)



Dunning-Kruger effect



200AD



5 May, 2015

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14 November 2011 Last updated at 11:43

Former army medic designs burns app to aid treatment

A former soldier has designed a mobile application aimed at improving accuracy in the treatment of burns in the field.

Messey Burns allows medics to work out on an iPad or iPhone how much fluid a patient needs.

Wirral designer Chris Seaton, an ex-Royal Army Medical Corps captain, came up with the idea while studying for a PhD at the University of Manchester.

Mr Seaton witnessed the treatment of burns victims firsthand during his time serving in Afghanistan.

The former captain, who is studying Computer Science, was an army medic for four years.

He said he designed the app in order to both speed up the process of administering fluids and reduce errors in treatment.

The issuing of the right amount of fluids to burns victims is essential to their survival, as receiving too little can cause a victim to go into shock.

At present, calculations of treatment by field medics and non-medical personnel are often done quickly with a pen and paper, a situation which can carry a risk of mathematical mistakes.

On the app, users enter in their patient's affected body part, body weight, and details of age and weight and then receive precise details of how much fluid should be given.

Tests by experts at St Helens and Knowsley NHS Trust and Liverpool showed the errors in the amounts given were reduced by a third when using the app.

Chris Seaton served in the Royal Army Medical Corps in Afghanistan

Top Stories

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- Inmate planned kidnap and escape
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Features

- Feline focus** Online exhibition celebrates the photography of cats
- Locked in love** Why the peregrine falcons of Paris are in love with the Eiffel Tower
- Laughter lines** Things you may not have known about being amused
- Catch me if you can** Why the world's most wanted criminal is still on the run
- Return of the caliph** Why the idea of a single Muslim state keeps coming back

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1	2	3
UK base in Afghanistan handed over	US nurse criticises quarantine treatment	Muslim inmate at IoW Prison planned



A bit of their code

```

function difference(a, b) {
    if (Math.abs(b - a) < 5)
        return 0;
    else if (a < b)
        return b - a;
    else
        return 24*60 - a + b;
}

.....
var timeSince
    = time.difference(burnTime, timeNow);

```

The Mersey Burns App: evolving a model of validation

Jamie Barnes, Annie Duffy, Nathan Hamnett, Jane McPhail, Chris Seaton, Kayan Shokrollahi, M Ian James, Paul McArthur, Rowan Pritchard Jones

Additional material is published online only. To view please visit the journal online (<http://tinyurl.com/oqy546f>). Accepted 20 October 2013; emended 2013;204160.

Department of Burns and Plastic Surgery, Whiston Hospital, Liverpool L3 5OR, UK; jmbarnes@whiston.nhs.uk

Correspondence to Jamie Barnes, Department of Plastic Surgery, Whiston Hospital, Liverpool L3 5OR, UK; jmbarnes@whiston.nhs.uk

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Abstract

Introduction 'Mersey Burns App' is a smartphone application that aids in the assessment of total burn surface area (TBSA) and calculation of fluid resuscitation requirements in burns. This paper presents two studies assessing the speed and accuracy of calculations using Mersey Burns (App) in comparison with a Lund and Browder chart and how a burn is assessed by medical students and clinicians.

Methods The first study compared the speed and accuracy of TBSA and resuscitation calculation for a photograph of a patient with a paper and pencil. Students were asked to calculate TBSA and emergency medicine trainees and consultants. Developing on some of the feedback and results of that study, a second study with them carried out using burns charts and the App. Students favoured the App over both modalities. Preference and ease of use of each modality were assessed anonymously.

Results The clinician study showed a lower variance in TBSA and fluid calculations using the App ($p<0.05$). The students study showed no difference in mean TBSA estimations ($p=0.7$). Mean time to completion of calculations was significantly faster and more likely to be correct with the App ($p<0.001$). Students favoured the App in the following categories: preference in emergency setting, confidence in output, accuracy, speed, ease of calculation, overall use and shading (Appendix 1).

Conclusions Mersey Burns App can facilitate quicker and more accurate calculations than Lund and Browder charts. Students preferred the App. This suggests a useful role for the App in the care of patients with burns by inexperienced staff.

Key messages

- There is a large degree of variability in estimating TBSA in burn injury. There are many different methods currently available, some of which relate to burns management which may be helpful.
- Mersey Burns is the first MRRA registered healthcare app.

What this study adds:

► This study demonstrates that the Mersey Burns App is an accurate and easily usable adjunct to assessing and calculating a fluid resuscitation regime for burn injured patients.

Mersey Burns awards

- First UK medical app to get a CE mark
- Winner, Excellence in Mobile Healthcare and overall winner, eHealth Insider Awards 2013
- Highly Commended, Improving Care with Technology, Health Service Journal Awards 2013
- Highly Commended, Innovative Mobile App of the Year, BCS UK IT Industry Awards, 2013
- Highly Commended, Best Use of Mobile Technology in Healthcare, e-Health Insider Awards, 2012
- Winner, Excellence in Innovation, NHS North West Health Innovation Awards, 2011
- Badged by the British Association of Plastic Reconstructive and Aesthetic Surgeons, BAPRAS

20

Fluids Prescription

Age: Adult
Weight: 60 kg
Burns: 100.0%

Time now: 20:43
Burn time: 20:47 (00:00 ago)
Fluids rate: 4 ml/h

Give 12000 ml in the first 08:00 hours (1500 ml/hr), then 12000 ml in the next 16:00 hours (750 ml/hr).
Calculation based on Parkland. Resuscitation fluids are Hartmann's solution.

2 ml/h | 3 ml/h | 4 ml/h

Done

Fluids Prescription

Age: Adult
Weight: 60 kg
Burns: 100.0%

Time now: 20:42
Burn time: 20:47 (23:55 ago)
Fluids rate: 4 ml/h

Give 12000 ml now, then 12000 ml in the next 00:05 hours (144000 ml/hr).
Calculation based on Parkland. Resuscitation fluids are Hartmann's solution.

2 ml/h | 3 ml/h | 4 ml/h

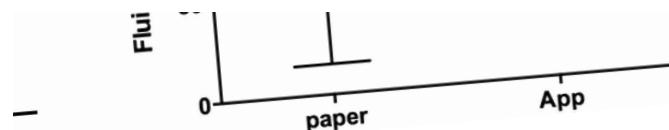
Done

4 mins in the future is now

Give 24 L over 24 hours
1 L per hour

5 mins in the future is 23:55 ago

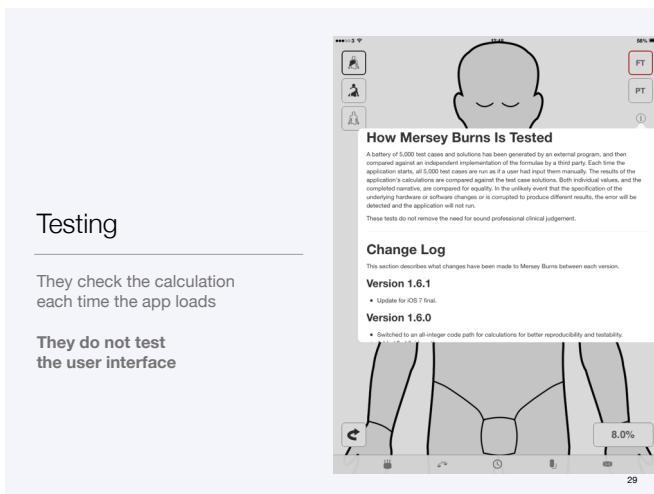
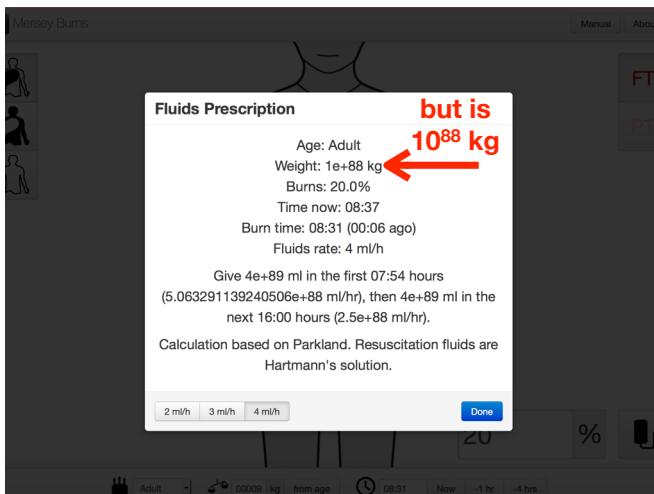
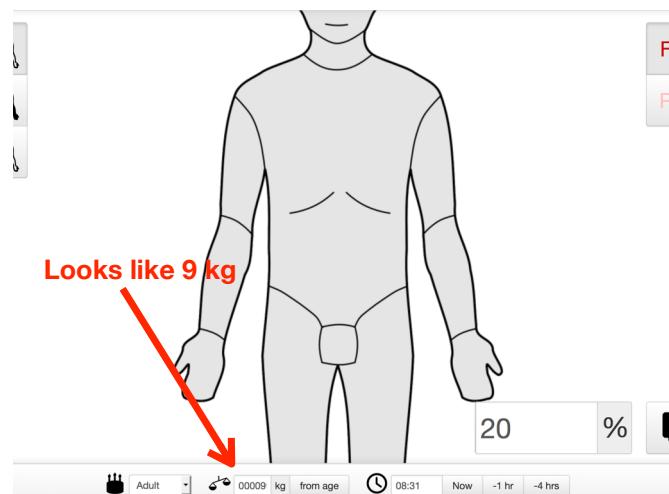
Give 24 L over 5 minutes?
144 L per hour?



accuracy setting, confidence in output, accuracy, speed, ease of use overall ($p<0.0001$) and ease of use ($p=0.0007$) (see online supplementary table S1).

Conclusion Advancement in the assessment of burns has been driven by the evolution of the Lund and Browder chart. The clinician shades in total body surface area (TBSA) burned before calculating the total. The surface area of the patient is a measure of TBSA and is highly accurate in adults and children and adaptations to the Lund and Browder chart are required when assessing a paediatric patient.

They'd get the same results
95% of the time
even if patients are killed



Their testing was not
looking for
design errors!

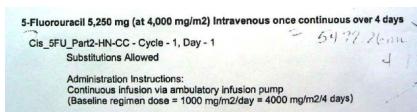
Parkland formula and invariants

- $V = 400 \times m \times A$
- $V = 400 \times m \times A$ or **error**
- $\text{error} = A < 0$ or $A > 100$ or $m < 0$ or ...
- $\text{error} = \text{unknown}(A)$ or $\text{unknown}(m)$ or $A < 0$ or ...
- $\text{error} = \text{wrongPatient}$ or $\text{unknown}(A)$ or $\text{unknown}(m)$ or $\text{malformed}(A)$ or $\text{malformed}(m)$ or $A < 0$ or **LOTS MORE**

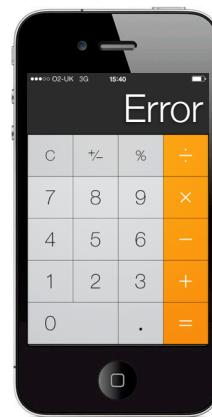


Denise
Melanson

31



$$\begin{aligned} & [\text{AC}] [\text{MRC}] [\text{MRC}] \\ & 4 \times 24 [\text{M+}] [\text{AC}] \\ & 5250 \div 45.57 \div \\ & [\text{MRC}] = \end{aligned}$$



iOS 8.3

$$4 \times -3 =$$



iOS 8.3



iOS 8.3

Unknown
unknown
knowns
everywhere



Chinese population
1,338,299,500



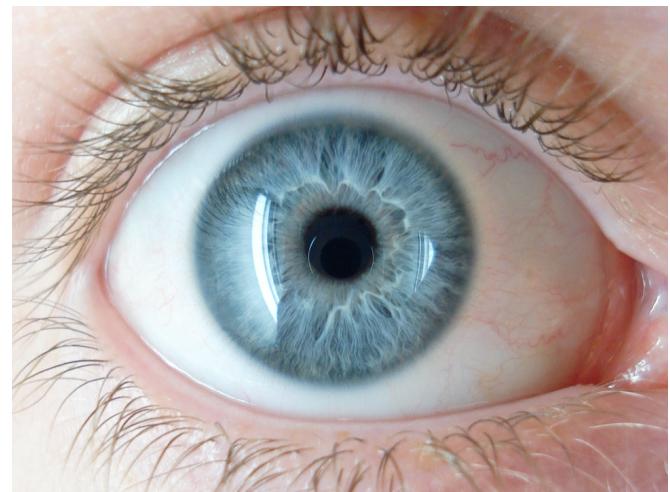
World population
6,840,507,000

Norwegian population
5,084,000



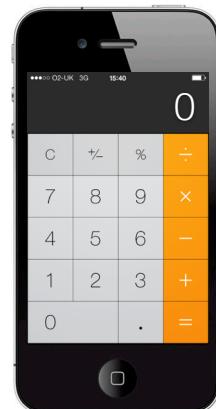
AC $1340000000 \div 6840000000 = 0.19590643$

AC $5084000 \div 6840000000 = \cancel{0.00743275}$



$$\frac{1}{0.1} + 3 \times 2$$

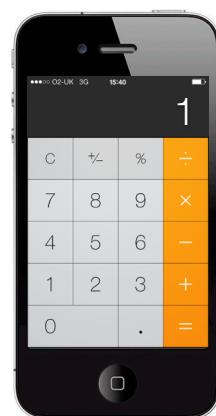
$$C \ 1 \div 0.1 + 3 \times 2 = 16$$



C



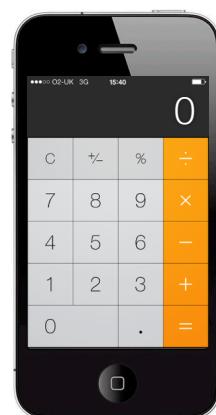
C 1



C 1÷



C 1÷0





C 1÷0.+



C 1÷0.+3x



C 1÷0.+3x2=



Overdose of CaCl₂

Hiatt was escorted from the hospital, put on administrative leave, then fired.

and

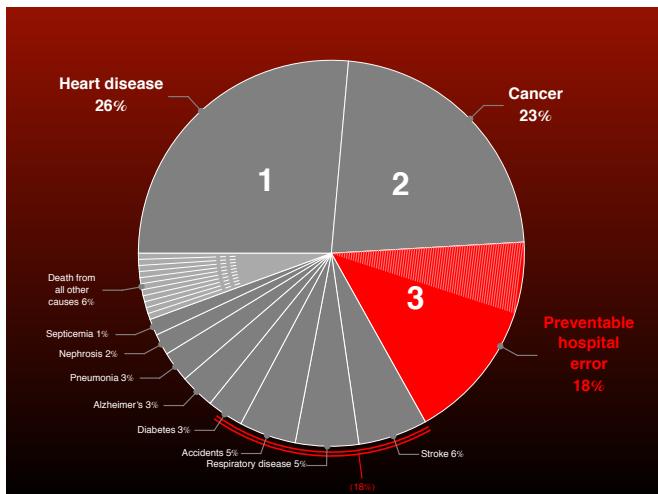
- Nursing Commission \$3,000 fine
- 80 hours of new coursework
- 4 years probation



The Seattle Times Nurse's suicide follows tragedy

The suicide of Kimberly Hiatt, a nurse at Seattle Children's hospital, has opened wounds for her friends and family members.

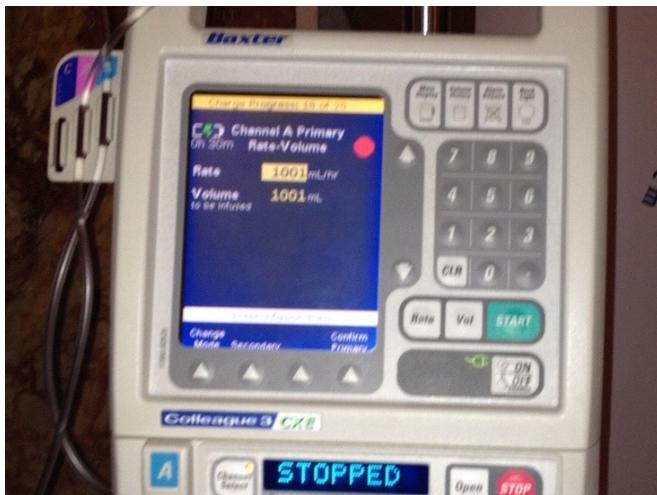
As a result, the Nursing Commission **closed its investigation ...**

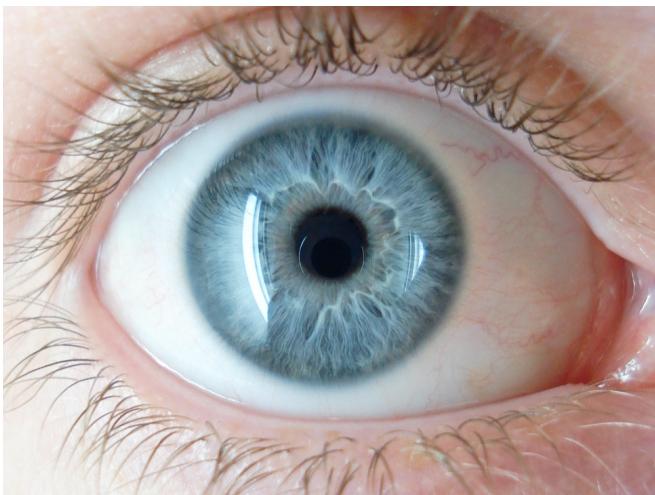


"High integrity is a way of trying not to fool yourself.

The first principle is that you must not fool yourself, and you are the easiest person to fool."

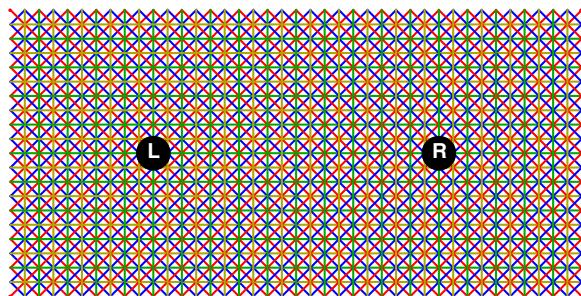
with apologies to Richard P. Feynman





L

R



Blindspots

- Human factors
- Situational awareness (tunnel vision)
- Not just users / operators / drillers
- Designers, programmers
(affect 1000s of users)
- Safety case experts

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We are the unknown knowns

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Conclusions

- What are you going to do?