A Day in the Life of a Clinical Academic Radiologist

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RCR Research Day, November 2016
What do I do all day?

Research

Research

teaching

teaching

Staff

Staff

Students

Students

Facilities

Facilities

Outputs – REF; reports; metrics

Outputs – REF；reports；metrics

Reporting

Reporting

Procedures

Procedures

MDMs

MDMs

Organising

Organising

CPD

CPD

Appraisal

Appraisal

Job planning

Job planning
Why? How?

The long view...........

Research ← Clinical

two ends of a spectrum  
highly interdependent

Questioning  
Motivated  
Determined  
Resilient  
Positive  
Fun

I can't decide whether to be a good example or a horrible warning
Really novel ideas that challenge accepted wisdom take a lot of time to reach acceptance

e.g. Harrison’s clock – Longitude, know where you are out at sea
Peptic ulcers are caused by bacteria
Moniz – Nobel Prize for frontal lobotomy; real achievement was inventing contrast angiography
Seldinger catheterisation technique
Albumin for hypovolaemic shock
Remember, a lot of people used to think that the earth was flat........
And Galileo was locked up for suggesting that the earth revolved around the sun...
The gap between: evidence and expert opinion

Thrombolysis for myocardial infarction

log odds ratio

Year | RCTs | Pts | 0.5 | 1   | 2   |
-----|------|-----|-----|-----|-----|
1960 | 1    | 23  |     |     |     |
1965 | 2    | 65  |     |     |     |
1965 | 3    | 149 |     |     |     |
1970 | 4    | 316 |     |     |     |
1970 | 7    | 1793|     |     |     |
1975 | 10   | 2544|     |     |     |
1975 | 11   | 2651|     |     |     |
1975 | 15   | 3311|     |     |     |
1975 | 17   | 3929|     |     |     |
1980 | 22   | 5452|     |     |     |
1980 | 23   | 5767|     |     |     |
1985 | 27   | 6125|     |     |     |
1985 | 30   | 6346|     |     |     |
1985 | 33   | 6671|     |     |     |
1985 | 43   | 21059|    |     |     |
1985 | 54   | 22051|   |     |     |
1990 | 65   | 47185|   |     |     |
1990 | 67   | 47531|   |     |     |
1990 | 70   | 48154|   |     |     |

Favors Treatment | Favors Control

P < .01

P < .001

P < .00001

Textbook/Review Recommendations

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<th>Rare/Never</th>
<th>Experimental</th>
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Antman JAMA 1992;268:240-8
‘Science’ and ‘Truth’

- Human nature
- High impact papers = success = next grant
- Positive results get into higher impact journals than neutral or negative results
- Classic small positive single centre study
- Chance
- Metrics demand inflated impacts = encourage lying
- 70% of results in high impact journals like Nature are not replicable
- Most fraudulent papers in Nature, Science, NEJM, Lancet, etc – biggest prizes drive worst excesses of bad behaviour
Plan your strategy

- Start early - Never too junior or too early
- Think about the hypothesis
- What do you need to prove or disprove it
- Get pilot data
- What resources will you need
- What administrative steps are needed – ethics, license, other approvals, etc
Think about how you say things – avoid sounding arrogant, naïve, over ambitious, etc.
Don’t underestimate time horizon

- Pilot data
- Ethics and regulations
- Publishing – establish track record
- Writing – months
- Submission
- Peer review
- Award
- Start small and build up
- But may need a second or third attempt
Don’t underestimate time horizon

idea

\[ \ldots \ldots \text{years} \ldots \ldots \]

\begin{align*}
\text{grant} \\
\£ \quad \£ \quad \£
\end{align*}
The long view

• Small grant
• Medium grant
• Large definitive grant

To get a large grant for a serious piece of work that will last several years requires a lot of very persuasive evidence.
Simple truth

- Failure is more common than success, even for the most successful people
- Papers – 2 or 3 rejections
- Grants – 1 success for every 2-3 failures
Take the plunge

• You have nothing to lose and everything to gain by applying for grants
• Everyone fails sometimes
• People with many grants probably fail more often than people with fewer grants
• Most funders award <20% of applications
• The research plan will be improved by the writing and discussion that goes into the grant
• Turn it into a review article
• Non funding is not a failure, just…………………
  irritating
Example: Thrombolysis for acute ischaemic stroke

1989 – case report
1990 – MRC Research Training Fellowship – pilot trial of intraarterial thrombolysis in acute ischaemic stroke and systematic review
1992 – Systematic review published in Stroke
1993 – Multicentre Acute Stroke Trial – SK +/- aspirin v control
1994 – 1st version of Cochrane Review
1996 – MAST stopped; NINDS trial rt-PA v control published
1998 – ECASS published
   - Systematic review: thrombolysis vs control in 3600 stroke patients
c1998 – 1st design for IST3 turned down
1999 – IST3 pilot funding from UoE, CHSS, DesAcc, Pharma
2002 – PPP Healthcare, Stroke Association, individual country funders
2005 – MRC
2008 – MRC extension – 3035 patients
2012 – Lancet publication + updated Systematic Review – 10minute presentation!
2014 – individual patient data meta-analysis 7600 patients

Very, very long time horizon
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Very, very long time horizon

Lancet 1987;ii:1391

From the British National Formulary 1995, section on thrombolysis

**CONTRA-INDICATIONS.** Recent haemorrhage, trauma, or surgery (including dental extraction), coagulation defects, bleeding diatheses, aortic dissection, coma, history of cerebrovascular disease especially recent events or with any residual disability, recent symptoms of possible peptic ulceration, heavy vaginal bleeding, severe hypertension, pulmonary disease with cavitation, acute pancreatitis, severe liver disease, oesophageal varices. In the case of streptokinase or anistreplase, previous allergic reactions to either drug, or therapy with either drug from 5 days to 12 months or more previously.
First randomised controlled trial of intra-arterial thrombolysis in acute ischaemic stroke - 1991

29 year old woman collapsed outside the hospital.
Scanned within 2.5 hours, angio at 3.25 hours, IA SK
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Very, very long time horizon ……now standard of care!
The Application

Less is more
The Application

Less is more

Don’t give reviewers easy targets
The more you complicate the design, the more opportunities you will have to be shot down

The more you practice, the better you get…..
The Application

Major criteria on which you will be judged:

- The need for the work
- The science
- The feasibility
- Clarity and presentation

Think about how others see the issue
Best piece of advice I ever got:

When addressing funding committees, reviewers of papers or grants, expert panels, etc:

*Imagine that you are talking to a schizophrenic in the middle of a bad psychotic relapse, brandishing a large knife.....*
Waiting for the outcome

• Remember, you have a 80% chance of failing, on average, so don’t sit and wait for the disappointing letter
• Get on with the work and look for other funding sources
• Applying for grants gives you very valuable experience, refines and improves the research
• Be positive; accept that the world sees things differently and needs some convincing

the orange had not yet heard from the del monte man. his confidence was low
The long view

• Diversify – you rarely get all the funding you need from one source
• Don’t put all your eggs in one basket
• Have a portfolio of funders – if one pulls the plug it is less of a disaster than if you rely on one large funder
Stay on the road

All other creatures evolved from fish, so why are WE still fish? Right now humans are up on land drinking beers... driving cool cars... and what have we got?... Water and bloody plankton, that’s what we’ve got!
Stay on the road

Three professors, two honorary professors, three senior lecturers, two honorary senior lecturers, three PhDs in Radiology

Four full time research MR scanners (2 x 3T, 1 x 1.5T, 1 x 7T), full time research MR-PET scanner, 2 x PET-CT scanners, cyclotron, extensive image analysis suites

Medical physicists, engineers, computer scientists, various medical specialties, informaticians, multiple non-clinical PhDs, etc, etc, etc
Flotterstone, Claire Kenny, Summer 2013

I am a former patient; one of the first ever to be treated with ‘clot busting’ treatment in stroke. The experience changed my life at the age of twenty nine; made me begin to understand the deep connection between us all, and appreciate the kindness of strangers.
Always thank your funders and collaborators

MRC
Wellcome Trust
Scottish Funding Council
CSO
EPSRC
BBSRC
Stroke Association
Chest Heart Stroke Scotland
NHS Lothian
U o Edinburgh
Row Fogo Charitable Trust,
Royal College of Radiologists
NIH USA
MS Society
NHS R+D HTA Panel
Sackler Foundation
Research into Ageing
AgeUK
Numerous other charities
The public

Staff in radiology, medical physics, stroke, geriatrics, statistics, neurology, neurosurgery, informatics, endocrinology, cardiology, ethics and R+D offices, finance offices, radiographers, IT, psychology, etc, etc, etc
Take the plunge

If you don’t buy a ticket, you can’t win the lottery

If radiologists don’t do good research, especially imaging research, then heaven help us........