Green Dialysis

PART I

Climate Change and Us

What Nephrologists and Healthcare Providers Need to Know

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Green ‘serious’ + Green ‘funky’

A talk in 2 parts:

**First:**
A journey through Climate Change and it’s potential implications
  – At a global level
  – At a healthcare level
  – At a dialysis delivery level
Green ‘serious’ + Green ‘funky’

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  – At a global level
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Later:
A glimpse of some “fun stuff’ we have been doing at a service level – to try to make a difference
“Houston: we have a problem … ”

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  - The work of over 1000 scientists
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• More concerning, it stated with “high confidence” that:
  – continued unchecked, warming would lead to “severe, pervasive and irreversible global impacts for people and ecosystems”.

IPCC prediction models

• Four different models were suggested, each based on different 21st century pathways for greenhouse gas and air pollutant emissions and land-use.

  – ‘best-case’ scenario involving drastic reductions in greenhouse gas emissions, starting now through to ...

  – ‘business as usual’ scenario with greenhouse gas emissions continuing at their current high rate

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  – storm surge
  – ocean acidification
  – reduction in marine biodiversity
  – mudslides and landslips
  – extinction of a ‘large fraction” of plant and animal species.

Current global water stress

- Examples regions with water shortages
- USA Carribbean
- North Africa
- Middle East
- India
- China
- Australia

Legend:
- Little or no water scarcity
- Physical water scarcity (use of water resources > 75%)
- Approaching physical water scarcity (use of water resources > 60%)
- Economic water scarcity (use of water resources < 25%, low-income region)
- Not estimated
Current global heat stress

Earth Kicks Off 2016 With the Most Abnormally Warm Month Ever Measured
Australia - heat stress ... 2013-2014
Further ...

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– Another has predicted displacement of up to 1 billion people (1 in 7 on the planet) - mainly due to water shortages and coastal and riverine flooding (2)

Options do remain ...

• The IPCC tells us that:
  – Options to transition to a low-carbon economy still exist
  – Multiple mitigation pathways are available to limit warming to 2°C

Options do remain ...

- The IPCC tells us that:
  - Options to transition to a low-carbon economy **still** exist
  - Multiple mitigation pathways **are** available to limit warming to 2°C
  - “**All we need is the will to** change .. motivated by knowledge and understanding of the science of climate change”

  *Rajendra Pachauri - Chair of the IPCC*

Health impacts

• WHO estimates ~250,000 extra deaths/yr by 2030 from changes to:
  – ambient temperatures
  – clean air
  – safe drinking water
  – sufficient food
  – secure shelter

• Direct healthcare costs of this will be ~US $ 4 billion/yr by 2030

• Impacts are expected to be most severe for:
  – the developing world
  – the young
  – the elderly
  – those with pre-existing medical conditions (i.e. dialysis patients)

Healthcare systems are huge contributors

• Healthcare systems emit an enormous CO₂ burden
  – The UK NHS creates 25% of all public sector emissions (1)
  – 8% of all US CO₂ emissions arise from health care (1)

(1) WHO Fact sheet 266. http://www.who.int/mediacentre/factsheets/fs266/en/
Healthcare systems are huge contributors

- Healthcare systems emit an enormous CO$_2$ burden
  - The UK NHS creates 25% of all public sector emissions \(^{(1)}\)
  - 8% of all US CO$_2$ emissions arise from health care \(^{(1)}\)

- And ... within healthcare ...
  - Dialysis programs contribute disproportionately

(\(^{(1)}\) WHO Fact sheet 266. http://www.who.int/mediacentre/factsheets/fs266/en/)
with this in mind

Two studies
(one in the UK, one in Australia)
have documented the
recurrent per capita dialysis environmental footprint

... One of these has been our own study
The carbon footprint of haemodialysis

The Australian study examined the relative contribution to the total CO$_2$ footprint of suburban satellite HD unit ... including:

- procurement of pharmaceuticals/consumables
- medical equipment
- energy utilization
- travel and transport
- water usage and waste

Lim AE, Perkins A, and Agar JWM. Australian Health Review, 2013, 37, 369–374
The carbon footprint of haemodialysis

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  • procurement of pharmaceuticals/consumables
  • medical equipment
  • energy utilization
  • travel and transport
  • water usage and waste

• The annual per-patient HD-generated carbon footprint was 10.2 tonnes CO₂-equivalents

• This is more than half the Australian mean annual per capita CO₂ emission estimate of 18.8 tonnes CO₂-equivalents

Lim AE, Perkins A, and Agar JWM. Australian Health Review, 2013, 37, 369–374
Carbon Footprint Data
(Suburban satellite unit – Geelong 2012)

Factors easiest to modify and to reduce overall carbon impact

As a % of total tonnes CO₂-equivalents

Lim AE, Perkins A, and Agar JWM. Australian Health Review, 2013, 37, 369–374
Carbon Footprint Data
(Suburban satellite unit – Geelong 2012)

Some HD machines may leave a lighter carbon footprint

Ref: Connor et al: QJM 2010. 103(12): 965 - 975

Lim AE, Perkins A, and Agar JWM. Australian Health Review, 2013, 37, 369–374
Carbon Footprint Data
(Suburban satellite unit – Geelong 2012)

Mainly consumables with the main modifiable impact being waste disposal

Lim AE, Perkins A, and Agar JWM. Australian Health Review, 2013, 37, 369–374
So ...

what is the environmental ‘price’ of dialysis
Summary – Australian data

Water

Water consumption for a “standard” 4 hour HD session is approximately 500 L/Rx

Compare this to the average Australian daily per capita domestic use of 160L

Barraclough KA, Holt SG, Agar JWM. Nephrology: Climate Change and Us (In Press)
Summary – Australian data

Power

The weekly power draw for 1 conventional 3 x 4 HD $R_x$ plus the per-capita weekly power draw for RO water treatment for those sessions equates to 50% of the weekly power draw of an average Australian 4 person home.

Barraclough KA, Holt SG, Agar JWM. Nephrology: Climate Change and Us (In Press)
Summary – Australian data

Waste

The 2.5 kg of dialysis consumable waste/treatment yields a cumulative ~400 kg/person/year

Compare this with the municipal waste generation of 660 kg/Australian/year

Barraclough KA, Holt SG, Agar JWM. Nephrology: Climate Change and Us (In Press)
So ... is it all too hard?
So ... is it all too hard?

or

Are there proactive, mitigating steps?
In healthcare, we are very gung-ho at the front end of care
But take little interest in the back end of care
One country is showing us the way

The UK Green Nephrology Network
A systematic, nation-wide approach

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- They have developed systematic high quality national eco-research
- They have developed a set of national “green guidelines” that have led attitude and practice change
A systematic, nation-wide approach

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- Since formation in 2009, *this group has transformed* the sustainability of UK kidney care.
- They have developed systematic high quality national eco-research.
- They have developed a set of national “green guidelines” that have led attitude and practice change.
- These include:
  - Widespread and systematic RO water recycling.
  - Retro-fitting of heat exchangers into all dialysis systems.
  - Plastic cap and other plastic product recycling.
  - Widespread use of O/P telemedicine to reduce travel-related emissions.
UK units ‘signed on’ to Green programs 2009 - 2011

Courtesy Frances Mortimer: NHS Green Nephrology program
And, since 2011
all the remaining black dots
have gone green
We should all learn from them

http://sustainablehealthcare.org.uk/green-nephrology
We should all learn from them

If you take nothing else from this talk please read Frances Mortimer’s brief editorial in:

The Sustainable Physician .. *Clinical Medicine. 2010. 10(2): 110–11*
In Australia

- Visit the free website built by our Geelong Renal Service

www.greendialysis.org

- Our site offers a ‘green guide’ for all dialysis services
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- It provides a range of ‘how to do’ and ‘how to set up’ green options that cover ...

  - Water conservation practices
  - Alternative energy options
  - Waste recycling programs

Agar JWM: http://www.greendialysis.org
In Europe

The EDTNA Environmental Guidelines for Dialysis

• The combined European dialysis nurse, technician, and industry associations (the EDTNA:ERA) have produced:
  – A comprehensive handbook for ‘going green in dialysis’
  – It contains current and high quality guidelines and practical hints to reduce the environmental burden of dialysis
Its time to get smart

We don’t need a shoe phone
It's time to get smart

We don't need a shoe phone

We need to ...
It’s a case of ...
So
Let us have a short break
before I talk about

WHAT WE HAVE BEEN UP TO
IN MY TOWN

* Agar JWM. Seminars in Dialysis. 2015. 28(2). 186-192