SUSTAINABLE HOSPITALS – RESPONSE TO VICTORIAN CLIMATE CHANGE GREEN PAPER

Introduction:
Climate change is the biggest global health threat to the 21st century and one of the greatest barriers ever faced to achieving and maintaining human health. As health professionals we have a duty of care to firstly “do no harm” and advocate for action to protect health and humanity, although for many of us our work places significantly contribute to an adverse ecological footprint. This response to the Victorian Climate Change Green Paper aims to promulgate ideas and recommendations to help achieve large decreases in CO₂ emissions, energy usage, water consumption and landfill amounts often with concurrent financial benefits.

The scale of carbon reduction needed to limit the effects of global warming cannot be achieved without the health sector playing its part. The United Kingdom’s National Health System (NHS) produces 3.2% of the country’s total carbon footprint. Although there is no equivalent national Australian data, Victoria’s public hospital sector consumes 60% of the total energy used by all of its state government departments, produces the waste equivalent of approximately 200,000 households and Melbourne’s public hospitals use 1% of the city’s water. Victoria alone spends $10 million per annum disposing of solid waste from its public hospitals. Relatively minor improvements in resource efficiency could have significant environmental and financial benefits for the State.

To credibly address and improve the sustainability of our hospitals an extensive audit to determine total CO₂ emissions, energy consumption, waste management and water usage will be paramount. Unfortunately, at present both the national and state data in these areas are limited although we can be lead and be guided by the NHS Sustainability Development Unit.

1. CO₂ Emissions and Energy Consumption:
A recent analysis of CO₂ emissions from the NHS showed that the procurement of goods and services accounted for 60% of total CO₂ emissions, considerably greater than the 22% from powering NHS buildings or the 18% accrued by staff and patient travel.

1.1 Procurement (and food)
Attention to the processes by which medical drugs, equipment, and paper (accounting for 22%, 9% and 5% respectively of total NHS CO₂ emissions) are sourced could result in significant environmental and financial benefits. Disposable medical
equipment has increasingly replaced reusable items in our hospitals, due to lower perceived costs, infection risks and personal opinion, usually without considering the environmental impact. The few life cycle analyses of medical products have found that reusable devices are generally financially and environmentally preferable to single use comparators.12,13,14

Alterations in the production and packaging of medical drugs and equipment to improve their carbon footprint would be ideal, but unfortunately may be limited by the very nature of these products. Production of medical drugs is highly CO2 intensive. Professor James Clark, head of the Green Chemistry Centre of Excellence, University of York, UK, whilst discussing drug manufacturing has been recently quoted in the British Medical Journal as stating “it is widely accepted that 99% of the raw materials will end up as waste”.5 Hospitals therefore need to examine the environmental impact of their purchased products together with critically analysing the latest clinical recommendations, ensuring all products and equipment used are of genuine benefit to patients and that appropriate prescribing and administrating habits prevent unnecessary consumption, waste and costs.

Recommendations;
- Require Product Evaluation Committees to make purchasing decisions on whole life cycle financial and environmental costs.
- Encourage locally sourced, environmentally friendly products with minimal packaging.
- Promote widespread use and support of EcoBuy – “one-stop shop to support organizations to ‘green’ their purchasing.”15
- Require hospitals to purchase recycled paper, default printer settings to double sided printing and encourage electronic storage of patient information. (recycled paper requires 35% less energy to manufacture than new paper16)
- Source food that is fresh and locally produced to minimise the energy required for freezing / thawing / reheating and transport.

1.2 Energy
Hospitals are very energy intensive - a 300 bed mid-sized hospital uses the energy equivalent of approximately 5,000 Victorian households. Heating, air conditioning and ventilation account for 65% of hospital energy consumption whilst lighting contributes 20%.5 Hospitals provide a multitude of opportunities for improving hospital energy efficiency from large projects possibly involving co-generation, solar panels and wind turbines to lighting upgrades, computer hibernation and adjusting of thermostats closer to expected external temperatures. The Institute of Hospital Engineering of Australia (IHEA)17 is a useful information source.

Recommendations;
- Subsidise renewable energy for all Victorian hospitals rather than hospitals routinely purchasing discounted CO2 emitting power.
- Encourage local power production through co-generation, solar and wind power.
- Insulate and adjust ambient thermostats closer to predicted external temperatures.
- Instigate lighting upgrades, sensors and timers where possible.
1.3 Travel
Walking, cycling and utilising public transport would reduce CO₂ emissions, improve
staff fitness and set an example for patients.

Recommendations;
- Build all new hospitals close to public transport.
- Improve public transport and bicycle routes to existing hospitals.
- Routinely review the need for staff, patients and visitors to travel.
- Monitor and develop plans to reduce the CO₂ emissions from hospital fleet
  vehicles.

2. Waste
Disposal of hospital clinical (infectious) waste is approximately 10 times the cost of
general waste and requires high temperature incineration or chemical treatment
followed by shredding prior to deposition in landfill. Large financial and
environmental benefits could be achieved through more rigorous separation of
hospital infectious and general waste.

Although local councils have been collecting road-side co-mingled waste to recycle
for many years hospitals often still deposit similar objects into landfill. Significant
reduction in landfill waste can be achieved by proper recycling of paper, cardboard,
plastics and even food waste. In 2007 a regional Victorian hospital disposed of 100
 tonnes of compost waste (20% of general waste) to a worm farm rather than to
landfill.

Manufacturing recycled plastics uses approximately 25% of the energy compared to
equivalent primary plastic products with less, though still significant savings for glass
and cardboard. Hospital plastic recycling programs do exist in Victoria, some
hospitals have plastic recycling programs allowing the recycling of identifiable plastic
(International Plastic Association Codes 1-7). A Melbourne metropolitan plastic
recycling company is currently converting polypropylene surgical instrument wrap
(Kimguard®) into plastic products such as boardwalks and outdoor furniture. There
are also pilot plastic recycling projects which take ampoules, syringe barrels,
intravenous cannula covers and surgical wrap to make plastic flooring. In addition
a pilot program has recently been set up to recycle polyvinylchloride (PVC) into
irrigation pipes - significant as PVC comprises 25% of medical plastics and cannot
be recycled with other plastic.

Appropriate waste management can achieve large environmental and financial
rewards however far more significant benefits would undoubtedly be obtained with
less waste generation to begin with. Each patient in UK hospitals produces 5.5 kg of
waste per day. Australian estimates are similar whereas French and German
hospitals generate 1.9 kg and 0.4 kg per patient per day respectively. Therefore
critical analysis into why our hospital waste amounts are so great is needed to achieve
the maximum benefits in waste minimisation and recycling programs. Amounts of
clinical waste in particular should be examined as it is estimated to have higher fossil
carbon content compared with general waste, requires extensive treatment before
depositing into landfill and, as already stated, is 10 times the expense of general waste
to dispose of.
Recommendations;
- Develop programs to reduce waste amounts (examine the benefits of reusable versus disposable items).
- Ensure correct segregation of clinical (infectious) and general waste.
- Place co-mingled (non-infective) recycling receptacles in all hospital areas.
- Encourage and support plastic recycling programs.
- Compost appropriate waste rather than depositing as landfill.
- Feedback energy obtained from incineration of clinical waste into the power grid.

3. Water
Victoria’s water reserves are dangerously low due to increasing population levels, and an unprecedented drought worsened by climate change. It is imperative that efforts be made to reduce water consumption in all private, public, industrial and agricultural settings. Hospitals are well placed to deliver major water savings as they not only consume large amounts of water but also have the potential to collect substantial amounts of rainwater from their large roof areas. Within hospitals the majority of water used is through tap, shower and toilet use (approximately 80%). Although food processing, water cooling units and renal dialysis also contribute significantly to water consumption. Reverse-osmosis renal dialysis units “reject” or discard water (30-50% of the original mains water used) that is formed by pre-dialysis water filtration before exposure to blood products. This “reject” water falls within potable limits in most Australian districts and has been used in gardens and toilets, although there is great potential for more wide spread usage.

Recommendations;
- Annual audits of water consumption and cost for all hospitals and the implementation of water saving plans.
- Promote collection of rainwater (roof and ground) and uncontaminated renal dialysis water to be used as grey water.
- Mandate low flow showerheads and dual flush toilets.
- Ensure cleaning and sterilisation processes are using best practice water conservation methods.
- Efficient use of water should be integrated into all buildings at the design stage.

4. Medical Gases
The contribution of nitrous oxide (N\textsubscript{2}O) to the “greenhouse effect” is approximately 5% of the total. Although medical use is a small proportion of total N\textsubscript{2}O released (0.35-2%) \textsuperscript{29,30} it is significant when related to other daily activities. An anaesthetist, if using N\textsubscript{2}O for a day, is contributing as much to the ‘greenhouse effect” as driving an average car 500-1,000 km. Other anaesthetic gases also have greenhouse effects within the same order of magnitude\textsuperscript{31} yet they are used in far lower concentrations. N\textsubscript{2}O and isoflurane also have ozone depleting potential. Many anaesthetics are delivered safely throughout the world without the traditional use of N\textsubscript{2}O and at low flows to enable minimal anaesthetic gas use.
Recommendations:
- Encourage minimal N\textsubscript{2}O use.
- Ensure anaesthetic ventilators are purchased that enable low flow delivery of anaesthetic gases.
- Avoid piping N\textsubscript{2}O into new hospital buildings.

5. Governance and Workforce Development
The health sector must achieve improved environmental sustainability to help limit the effects of global warming as well as reduce waste.\textsuperscript{4} The NHS has chosen to take a lead in sustainable health with a NHS Sustainable Development Unit and commitments for a 10\% reduction in their CO\textsubscript{2} emissions by 2015 from 1990 levels and 80\% by 2050.\textsuperscript{11}

The Environment Protection Authority of Victoria has mandated that large energy and water users provide annual Energy and Resource Efficiency Plans (EREP)\textsuperscript{32} to reduce their resource use and waste generation. Unfortunately only Victoria’s very largest hospitals need to comply with EREP and the Australian National Greenhouse and Energy Reporting (NGER) Act,\textsuperscript{33} the latter requiring the reporting of energy consumption. The Victorian Government needs to encourage all health facilities, including hospitals, to include CO\textsubscript{2} reduction and sustainable development within their governance guidelines and set clear aims to monitor and reduce CO\textsubscript{2} emissions.

Sustainability standards as part of hospital accreditation could achieve rapid improvements in reducing the ecological footprint of our health systems and hospitals.\textsuperscript{34} The Australian Council of Health Care Standards (ACHS), through its Evaluation and Quality Improvement Programs (EQUIP)\textsuperscript{35} accredits Australian Hospitals against mandatory and preferred criteria. Within the standard EQUIP program there are currently no mandatory criteria addressing the issues of energy, water and waste auditing and efficiencies or the presence of a hospital sustainability / environmental officer or committee.

Recommendations:
- Healthcare regulators should consider making sustainability and the environmental impact of services an integral part of quality standards.
- CO\textsubscript{2} emission reduction and sustainable development should be an inherent part of each hospital’s performance and governance guidelines.
- Ensure the presence of an executive sponsored hospital environmental committee and sustainability / environmental manager.
- Include sustainability governance within job descriptions for all staff.
- Promote the education of staff and patients on the health effects of climate change. Provide programs to guide both staff and patients in reducing their own and their work places ecological footprint.

**Conclusion**
Our hospitals aim to heal the sick. Hospitals should not continue to contribute to climate change that will adversely effect present and future generations. In addition, many sustainability measures will be medium to long-term cost saving exercises. We need healthy, clean, green, sustainable hospitals in the State of Victoria.
References


17 Institute of Hospital Engineers of Australia-Technical Resources.  

18 Aust NZ Clinical Waste Management Industry Group. Code of Practice for the 

19 Ballarat Hospital Waste Report. Reprints available from don.colbert@bhs.org.au.


21 McGain F, Clark M, Williams T, Wardlaw T. Plastic recycling from the operating  

22 ANZCA ASM- Cairns 2009.  

23 Lee BK, Ellenbecker MJ, Moure-Eraso R. Analyses of the recycling potential of  

24 Tudor TL, Marsh CK, Butler S et al. Realising resource efficiency in the  
management of healthcare waste from the Cornwall National Health Service (NHS) in  

25 Intergovernmental Panel on Climate Change. 2006 IPPC guidelines for nacional  
greenhouse gas inventories. Nacional Greenhouse gas Inventories Program, Eggleston  

26 Southern Eastern Australain Climate Initiative. Global Warming Linked to Rainfall  

27 Agar JWM. Reusing renal Diálisis Wastewater: The Elephant in the Room. Am J  

28 Clerbaux CD, Cunnold J, Anderson A, Engel P, Fraser P, Mahieu E et al. Long-  
lived compounds, Chapter 1. In: Scientific Assessment of Ozone Depletion 2006,  
Global Ozone Research and Monitoring Project- Report No. 50. WMO, Geneva,  
2007. 1.1-1.63.

29 Ratcliff A, Burns A, Gwinnutt CL. The contribution of medical nitrous oxide to the  

30 Langbein T, Sonntag H, Trapp D, et al. Volatile anaesthetics and the atmosphere:  
atmospheric lifetimes and effects of halothane, enflurane, isoflurane, desflurane and  

31 McGain F. Why anaesthetists should no longer use nitrous oxide. Anaesth Intens  
32 EREP-Environment and Resource Efficiency Plans of the EPA Victoria. 


35 Mandatory Criteria for EQuIP 4 of The Australian Council of Healthcare Standards. 

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