

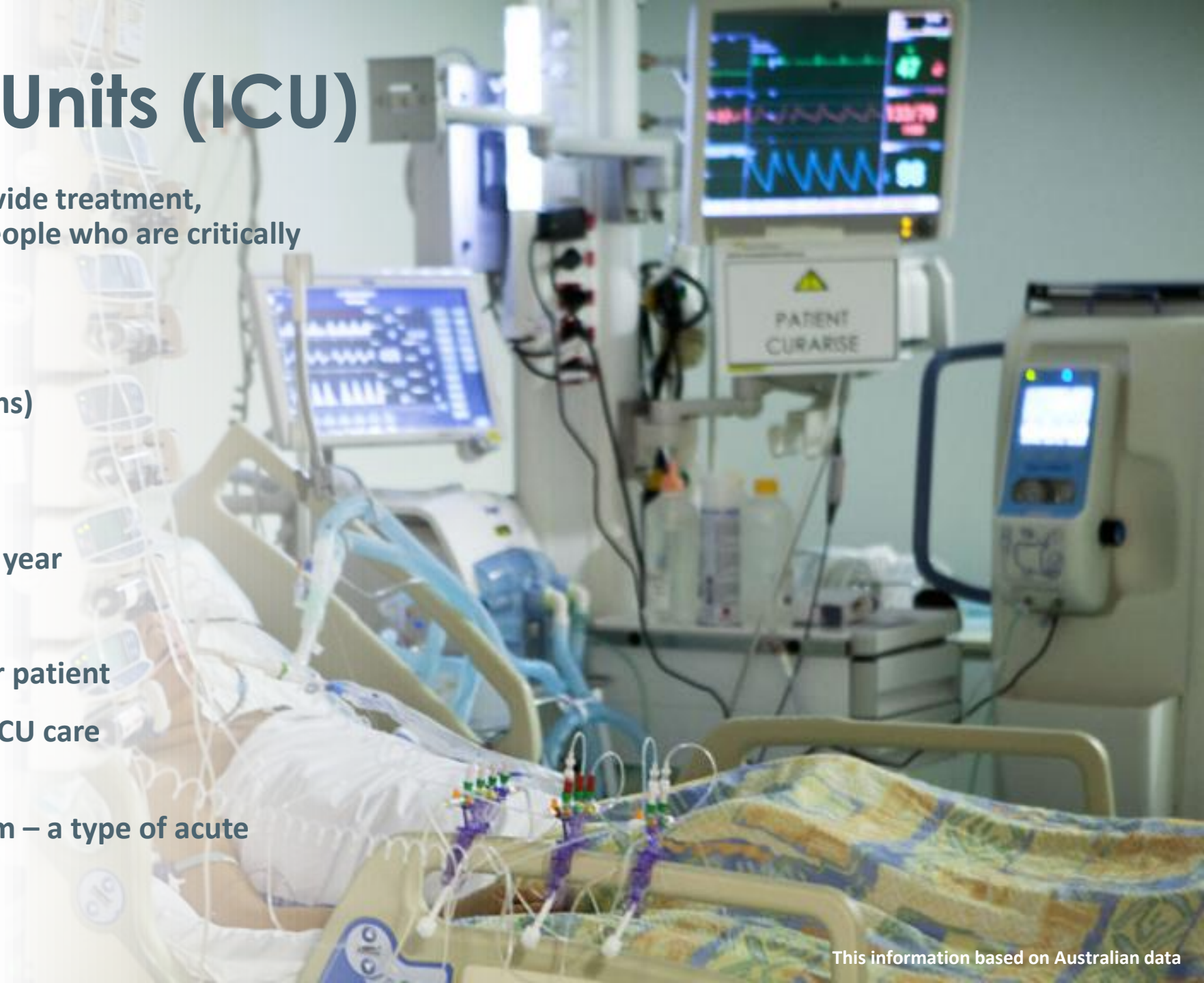
# *ICU of the Future*

Revolutionising ICU care for  
better patient outcomes



# Intensive Care Units (ICU)

- Specialist hospital wards that provide treatment, monitoring and life support for people who are critically ill
  - Cardiac / lung failure
  - Other / multi-organ failure
  - Serious injury (car crash, burns)
  - Post-surgery
- Worldwide shortage of ICU beds
- Approximately 150,000 patients / year
- >90% survive
- Expensive to run ~ \$6,000/day per patient
- Total annual operational cost for ICU care ~ \$2.1 billion
- Up to 75% experience ICU Delirium – a type of acute brain failure



# ICUs save lives... But what about a patient's quality of life after discharge?

ICU Delirium leads to ongoing and permanent problems:

- 20-25% experience PTSD
- Up to 80% experience cognitive impairment
- 30% experience depression
- Up to 70% experience anxiety
- 50% need assistance with ADLs
- 30% never able to return to work
- Family members equally affected





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Delirium and the ICU experience





## Light is the most important environmental cue for synchronising body clock to solar time

Abnormalities of circadian rhythms are common in ICUs due to

- Timing, colour temperature and intensity of light
- Lack of natural light
- Perception of night and day altered
- This can have devastating side effects on mental and physical wellbeing

# How loud is the average ICU?

## DAY

- Average ~60-65 dBA
- Peaks over 90 - 100 dBA
- Peaks above 100 dBA 22–28 times per hour



## NIGHT

- Average approximately 50 dBA
- Peak sounds above 85 dBA up to 16 times per hour



Sounds at or below 70 dB are safe. Sounds above 70 dB can harm hearing over time.

# The average ICU patient only sleeps 3-5 hours per day

- Median duration of unbroken sleep: 3 – 10 minutes
- Mean number of patient care activities per night: 42.6
- Decreased sleep can lead to:
  - Increased mortality
  - Delirium
  - Impaired wound healing
  - Mental changes such as memory formation
  - Psychological disturbances
  - Cognitive function

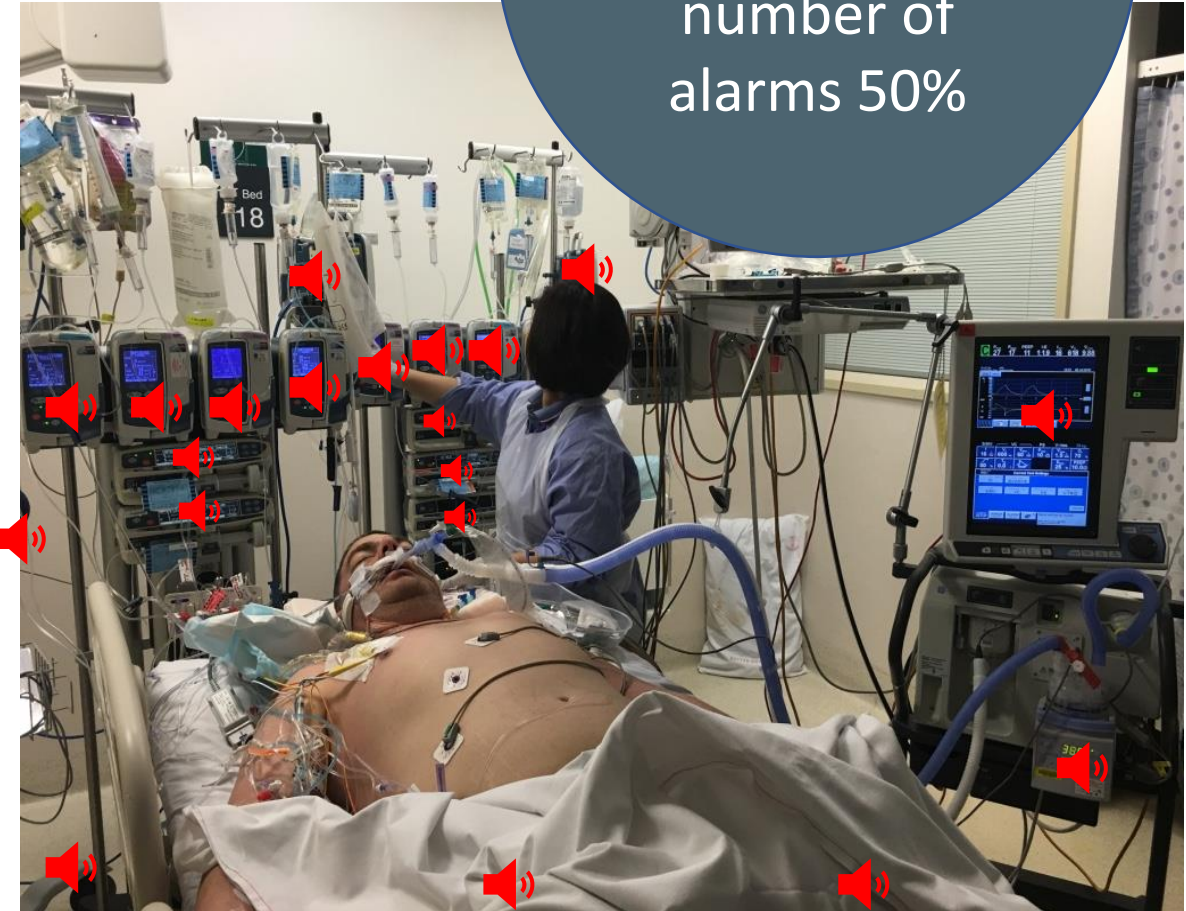




# Case study: The Prince Charles Hospital ICU

- 20 beds monitored over 31 days
- **TOTAL 600,000 alarms**
- 1,000 alarms per bed per day
- Each monitor: new alarm every 80 sec
- Each ICU pod: new alarm every 9 sec

Early data suggests we can reduce number of alarms 50%



# Redesigning the ICU environment to support patient recovery



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**Virtual visiting**

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**Diurnal / circadian lighting**

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**Connection with family to support recovery – photos and live video stream**

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**Patient and family education**

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**Patient engagement systems**

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HEALTH

## Delirium and PTSD are two common symptoms of ICU stays. Researchers are working to change that

ABC Health & Wellbeing / By Jennifer Leake for All in the Mind  
Posted Wed 1 Sep 2021 at 5:00am, updated Wed 1 Sep 2021 at 11:00am



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