

# Sundown Syndrome

**NHSGGC Primary Care Palliative Care Team**

Tel: 0141 427 8254

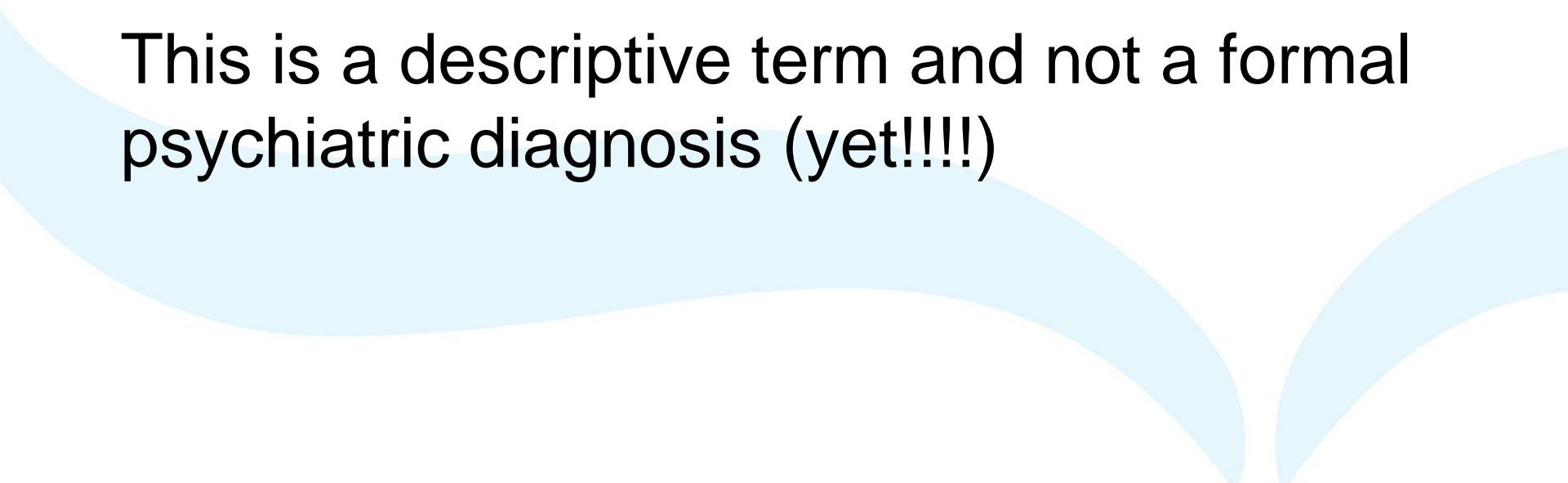
[palliative.care@ggc.scot.nhs.uk](mailto:palliative.care@ggc.scot.nhs.uk)

[www.palliativecareggc.org.uk/primarycarepcteam/](http://www.palliativecareggc.org.uk/primarycarepcteam/)

# Sundowning Syndrome

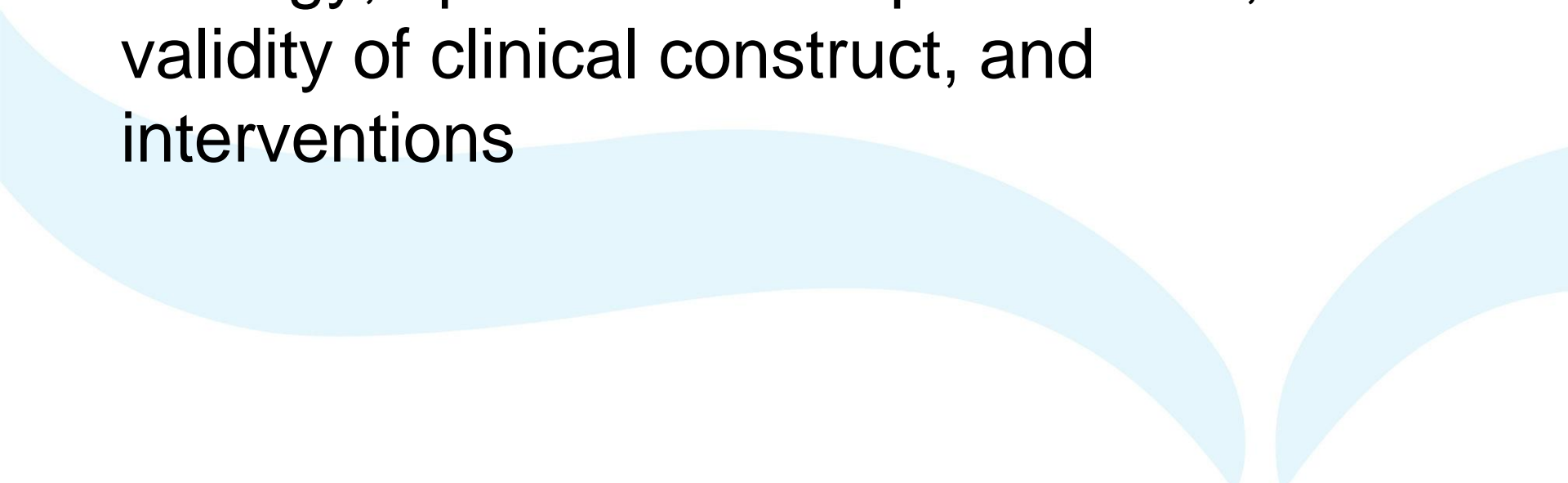
Also known as 'Sundowning'

This is a descriptive term and not a formal psychiatric diagnosis (yet!!!!)



# Definition

‘Sundowning’ in demented individuals, as distinct clinical phenomena, is still open to debate in terms of clear definition, etiology, operationalized parameters, validity of clinical construct, and interventions



# Definitions

“nocturnal delirium’ and ‘delirium and agitation within one hour of darkness”

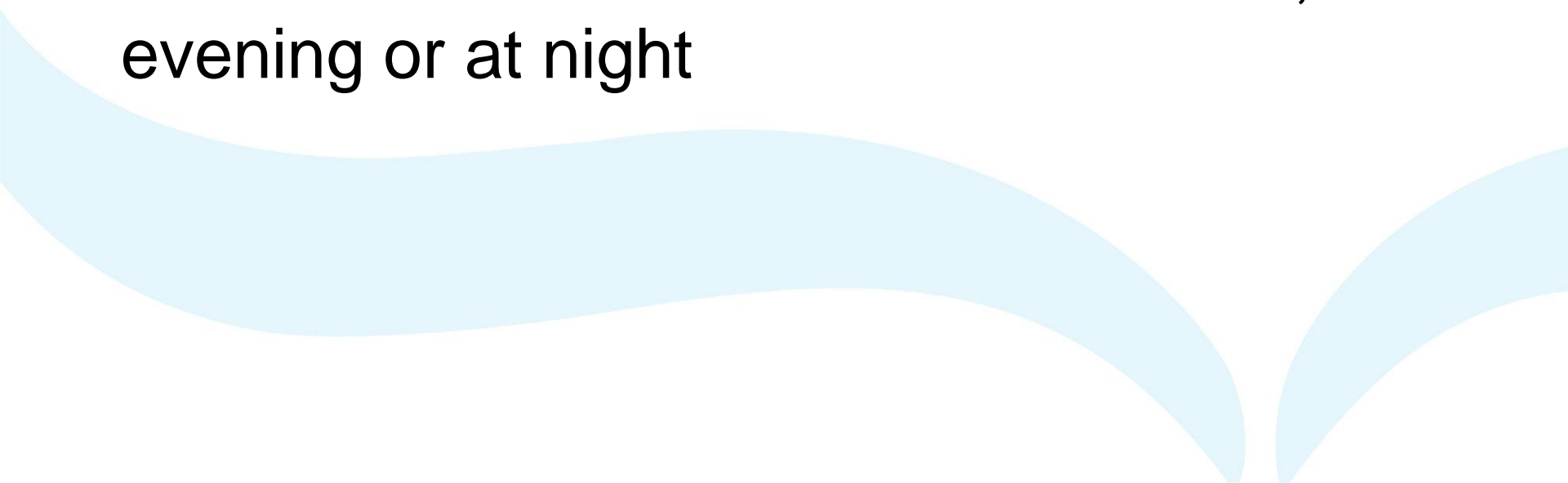
(Cameron, 1941)

“the appearance or exacerbation of behavioral disturbances associated with the afternoon and /or evening hours”

(Volicifer et al, 2001)

# Definition

‘Sundowning’ is broadly used to describe a set of neuropsychiatric symptoms occurring in elderly patients with or without dementia at the time of sunset, at evening or at night



# Definition

Generally agreed

Sundown Syndrome is characterized by the emergence of neuropsychiatric symptoms such as agitation, confusion, anxiety and aggressiveness in late afternoon, in the evening or at night

(Kim et al, 2005)

# Definition Clarity

Important to note:

Some of these behaviours may not be specific to Sundowning could be manifestations of dementia, delirium, Parkinson's disease, and sleep disturbance

# Definition Clarity

However:

Distinctive to Sundowning is the timing of these behaviours (Kim et al, 2005)





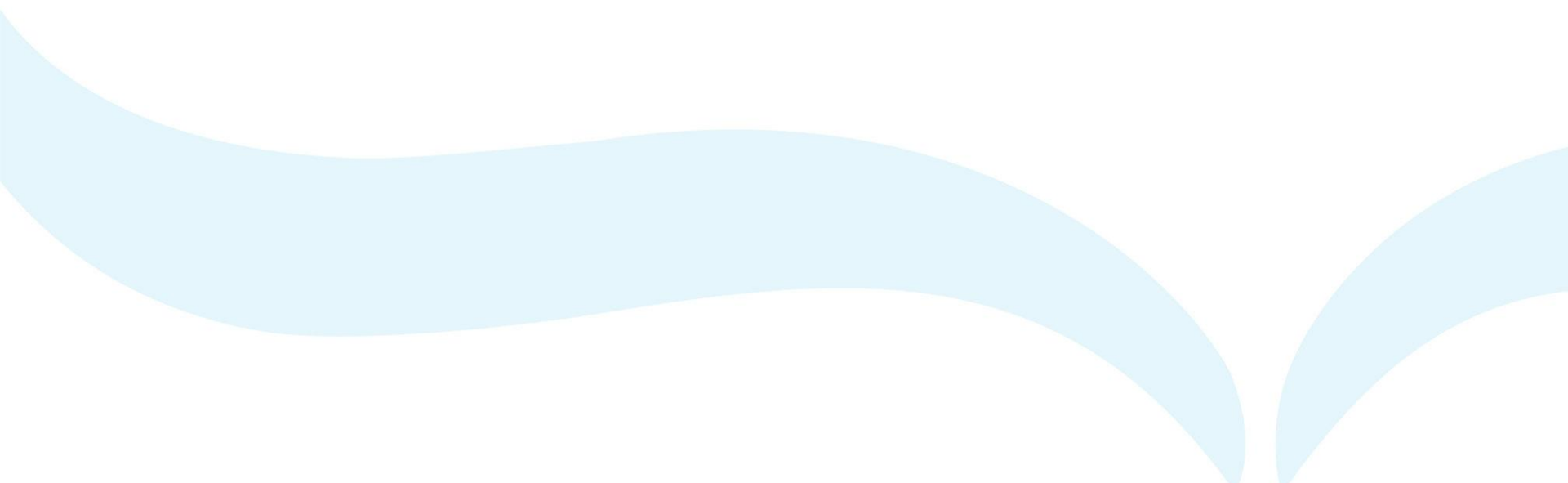
# Prevalence

“2.4% - 25% of patients diagnosed with Alzheimer’s disease had sundown syndrome” (Alzheimer’s Association, 2006)

2.4% - 66% has also been quoted in other literature relating to patients with Alzheimer’s disease or other types of dementia (Martin et al, 2000; Satlin et al, 1995, Alzheimer’s Association, 2006 etc)

# Prevalence

A further study suggested the prevalence of sundowning is as high as 66% in patients living at home (Gallagher-Thomson et al, 1992)



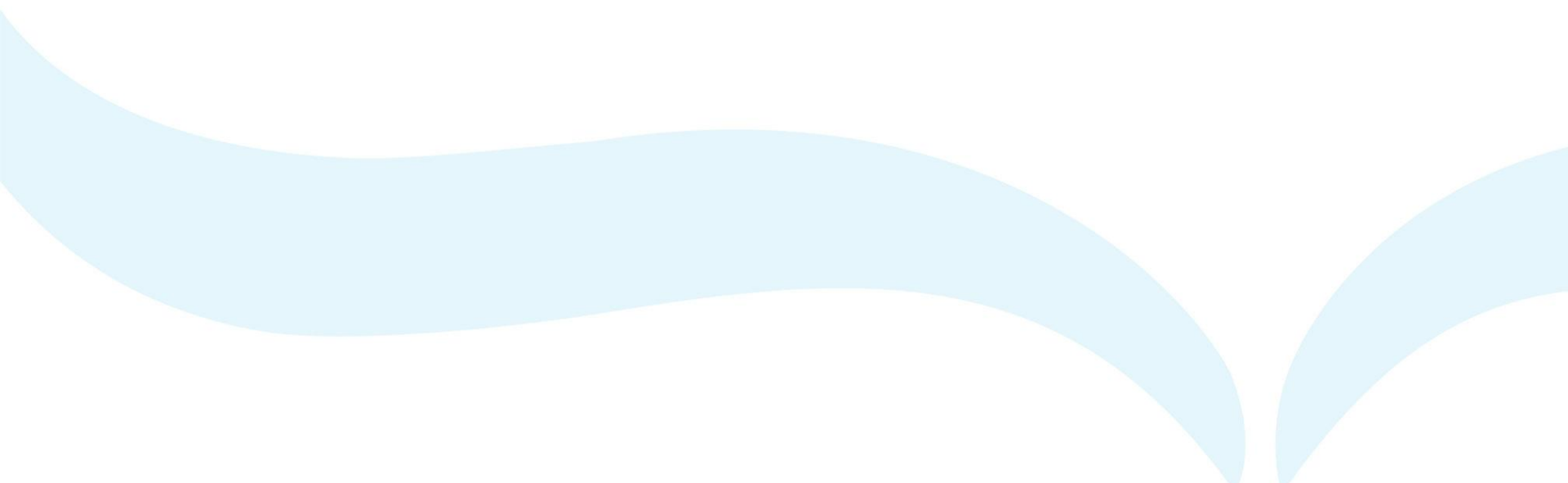
# Sundowning

**‘Sundowning’ is considered to be the second most common type of disruptive behavior in institutionalized patients with dementia after wandering** (US Congress, Office of Technology

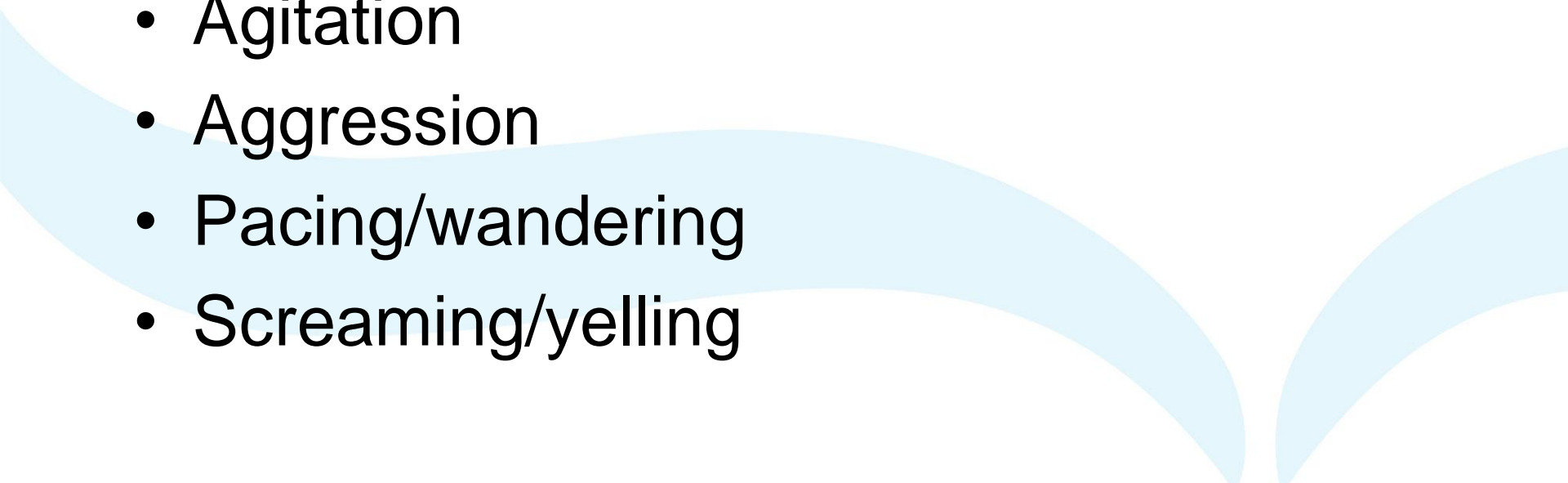
Assessment, 1992)



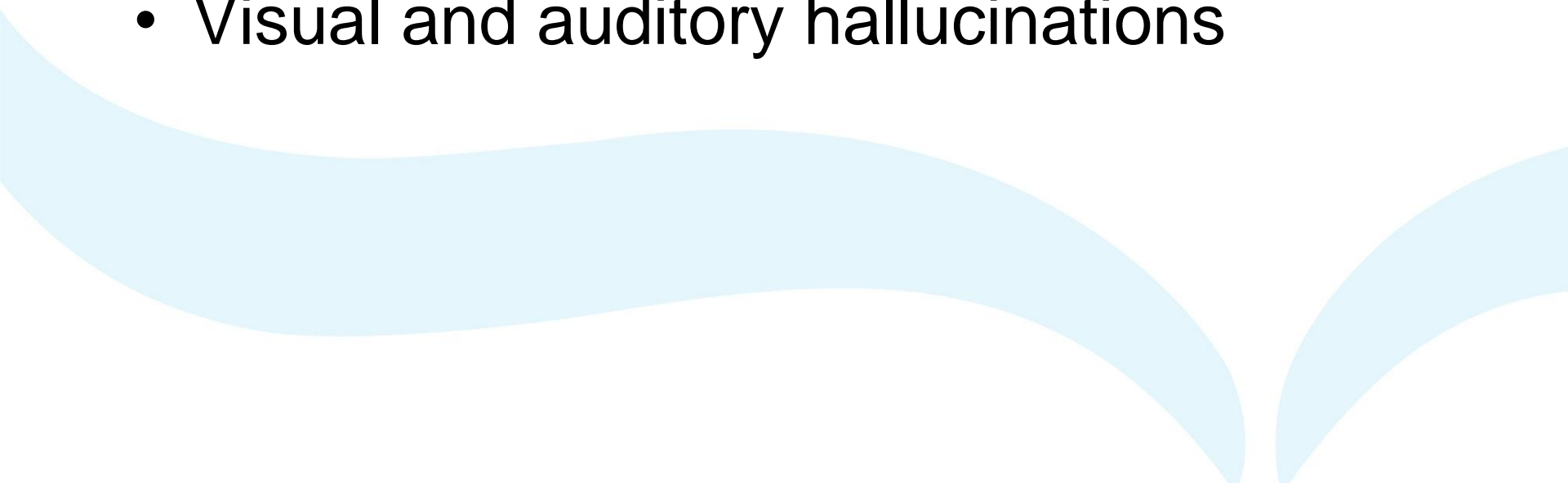
# Who does it affect?

- Cognitively impaired
  - Demented
  - Institutionalized elderly patients
- 

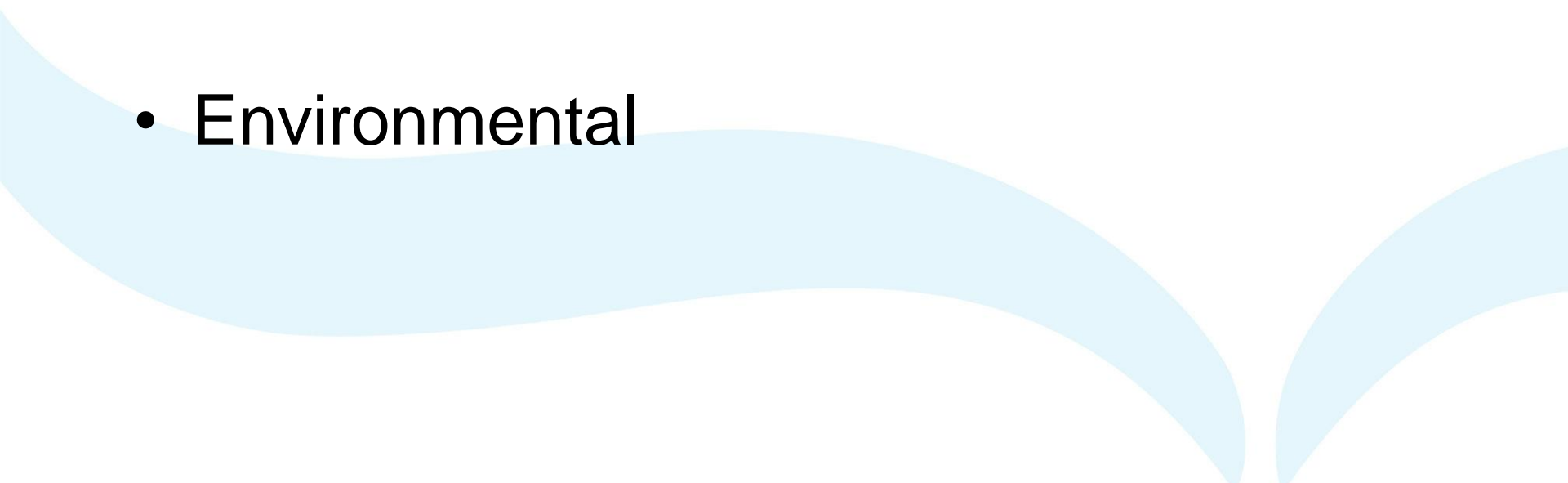
# Behaviours include:

- Confusion
  - Disorientation
  - Anxiety
  - Agitation
  - Aggression
  - Pacing/wandering
  - Screaming/yelling
- 

# Other Clinical features:

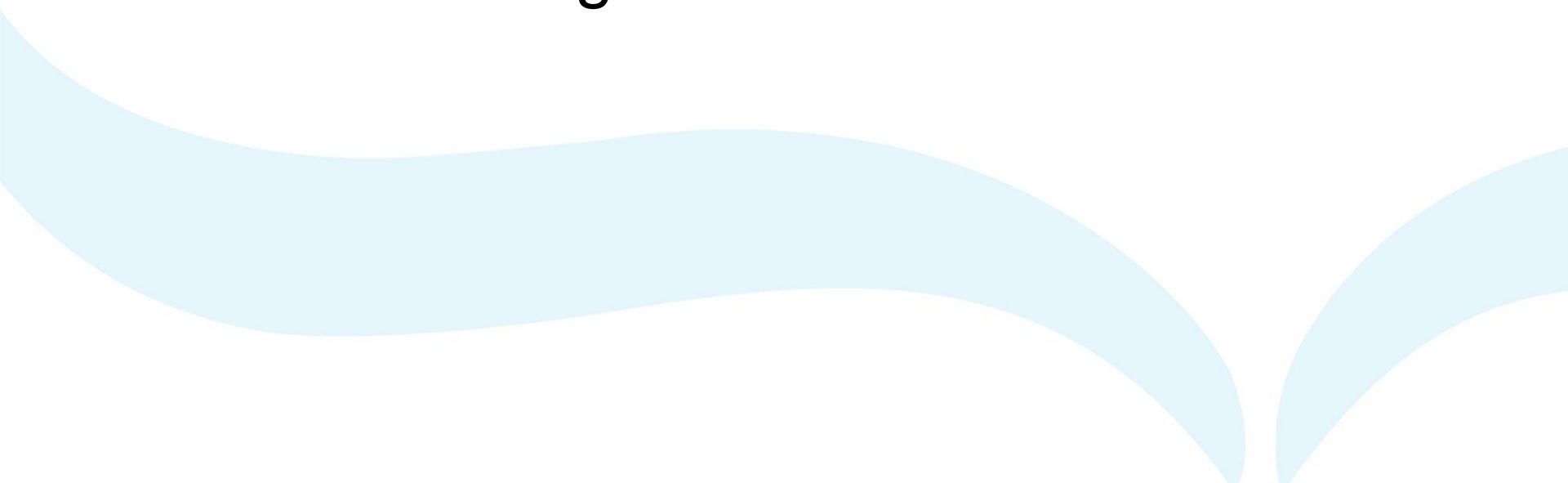
- Mood swings
  - Abnormally demanding attitude
  - Suspiciousness
  - Visual and auditory hallucinations
- 

# Aetiology

- Physiological
  - Psychological
  - Environmental
- 

# Physiological


May be a manifestation of specific path  
physiological abnormalities that interfere  
with normal circadian rhythm and  
behavioural regulation (Volicer et al, Satlin et al, Bliwsw et al etc)





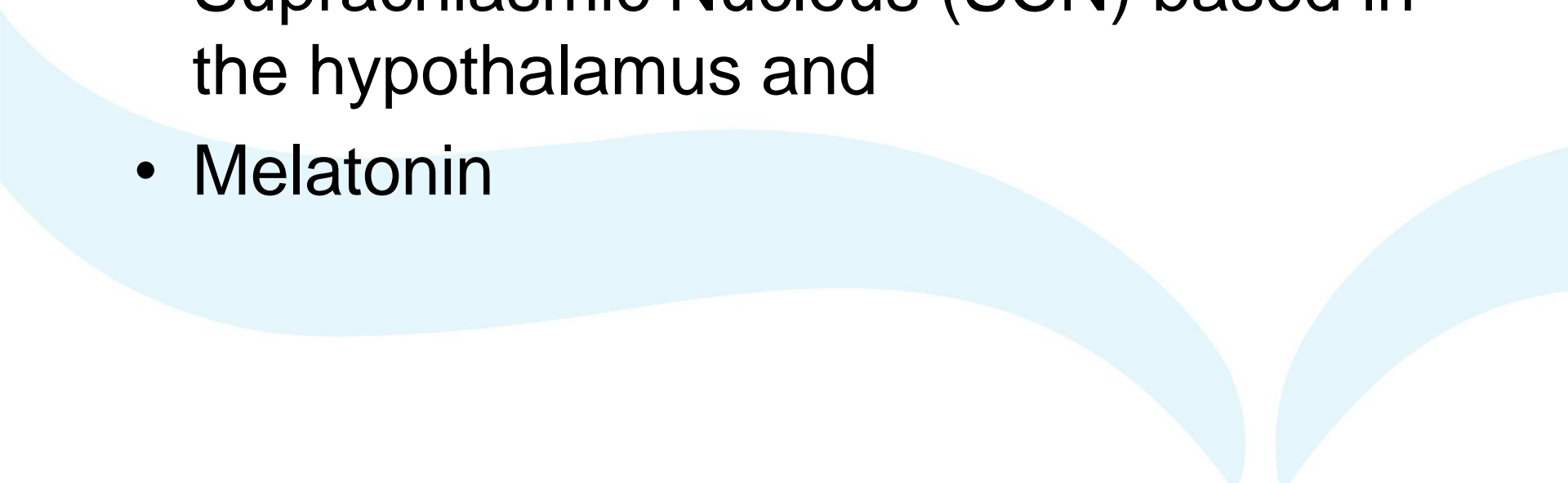
# Physiological

## Circadian Rhythm

- Disordered Circadian Rhythm
    - Earlier onset of dream periods
    - More frequent and abrupt awakenings episodes
- 

# Physiological

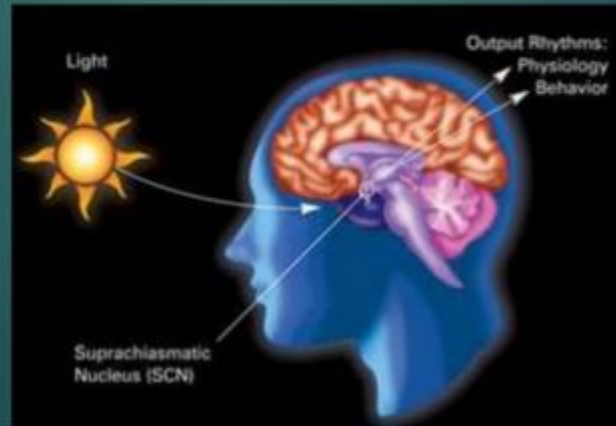
Components of biological Circadian Rhythm (responsible for sleep-wake cycling)

- Suprachiasmatic Nucleus (SCN) based in the hypothalamus and
  - Melatonin
- 

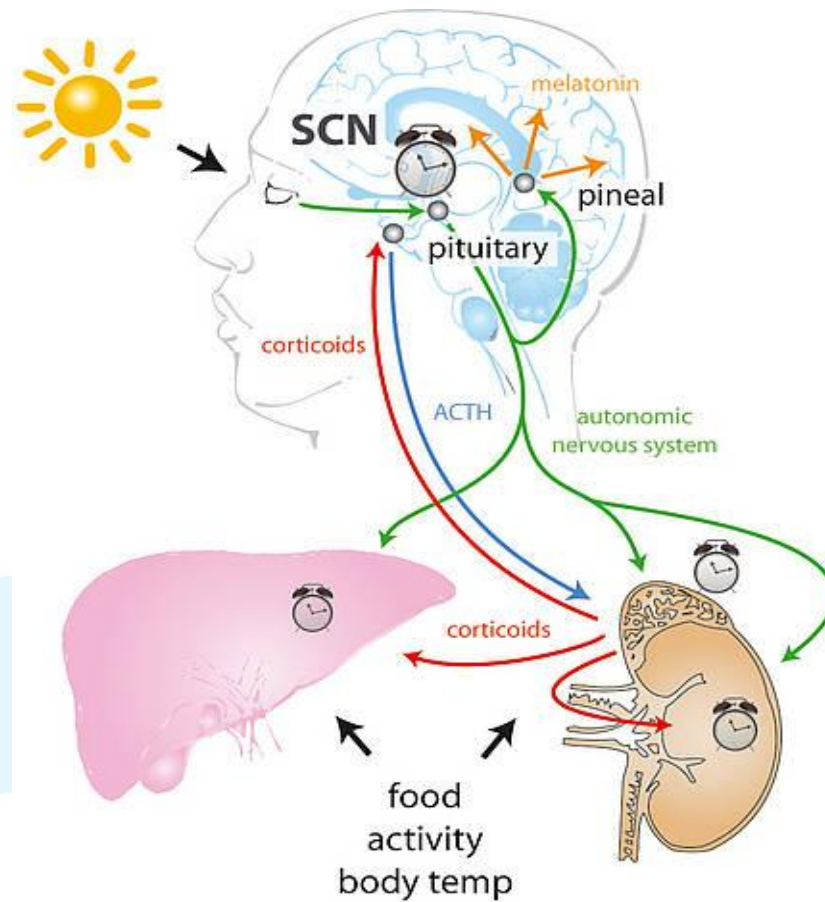
# Physiological

## Physical path of the biological clock

- ▶ Light → Retina → Suprachiasmatic nucleus (SCN) of the Hypothalamus gland → pineal gland → melatonin melatonin



# Physiological



# Physiological

## Suprachiasmatic Nucleus

- During the awake state produces an alerting signal
- During sleep time produces a sleep-inducing signal
- Other physiological functions including core body temperature, heart rate and hormone secretion (Wu YH and Swaab DF, 2005)

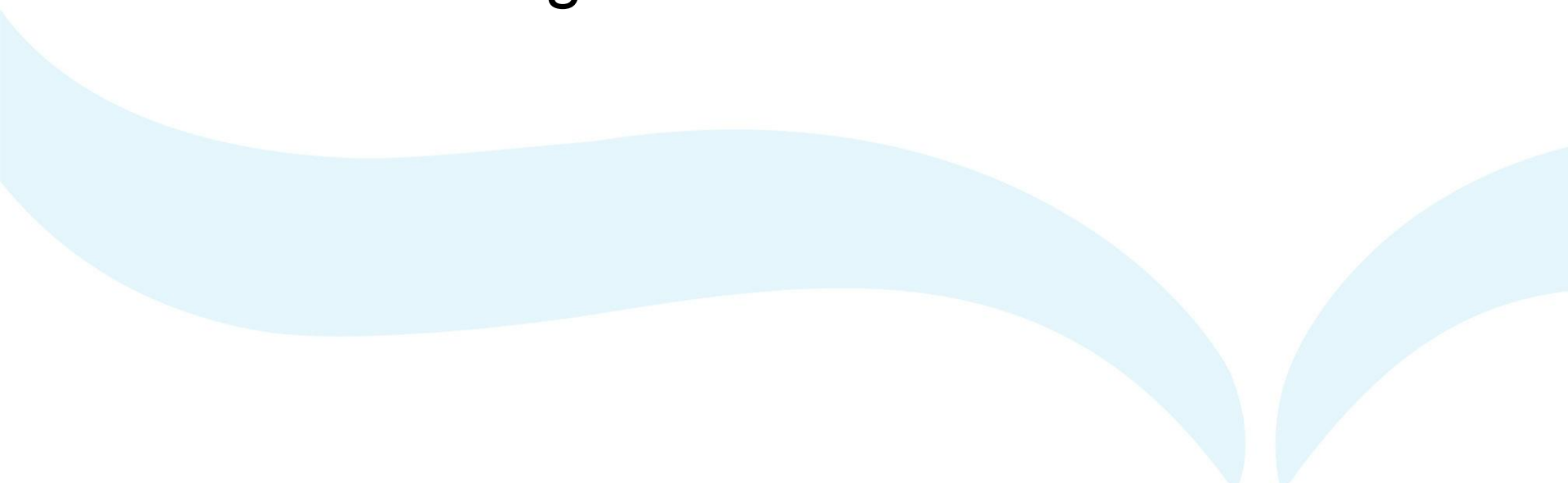
# Physiological

## Suprachiasmatic Nucleus

- Deteriorates with age
- Volume decreases in persons between ages of 80 -100
- Patients with dementia of Alzheimer's type have prominent abnormalities in the SCN

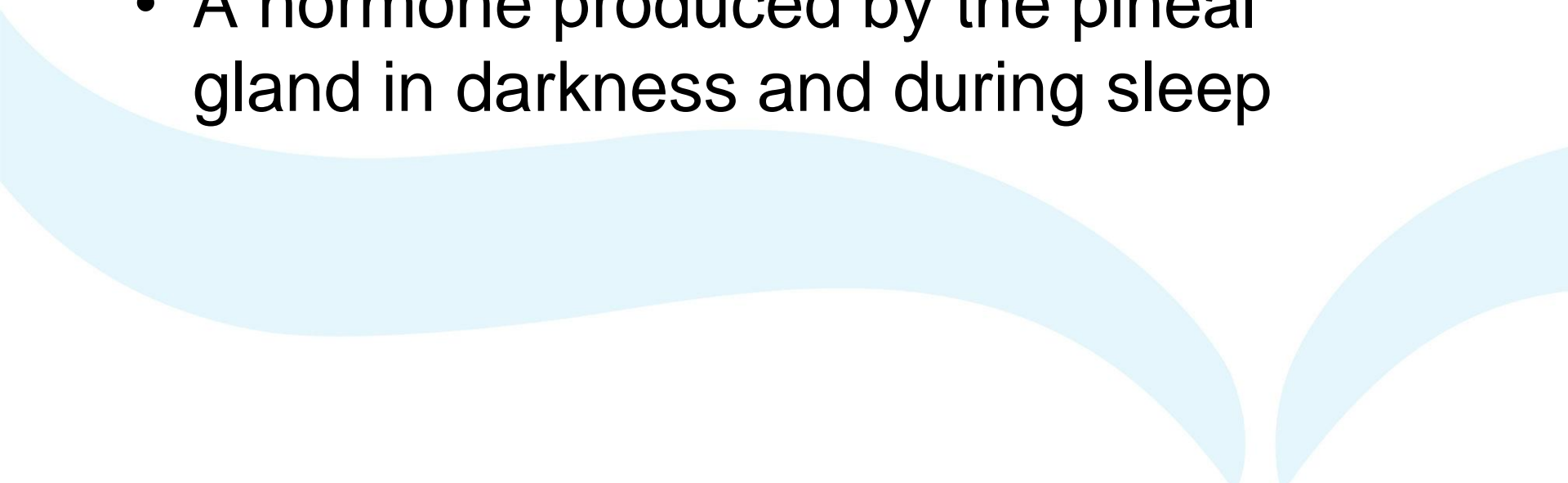
# Physiological

These pathological changes may theoretically explain disturbed sleep, agitation, confusion, and other symptoms of sundowning



# Physiological

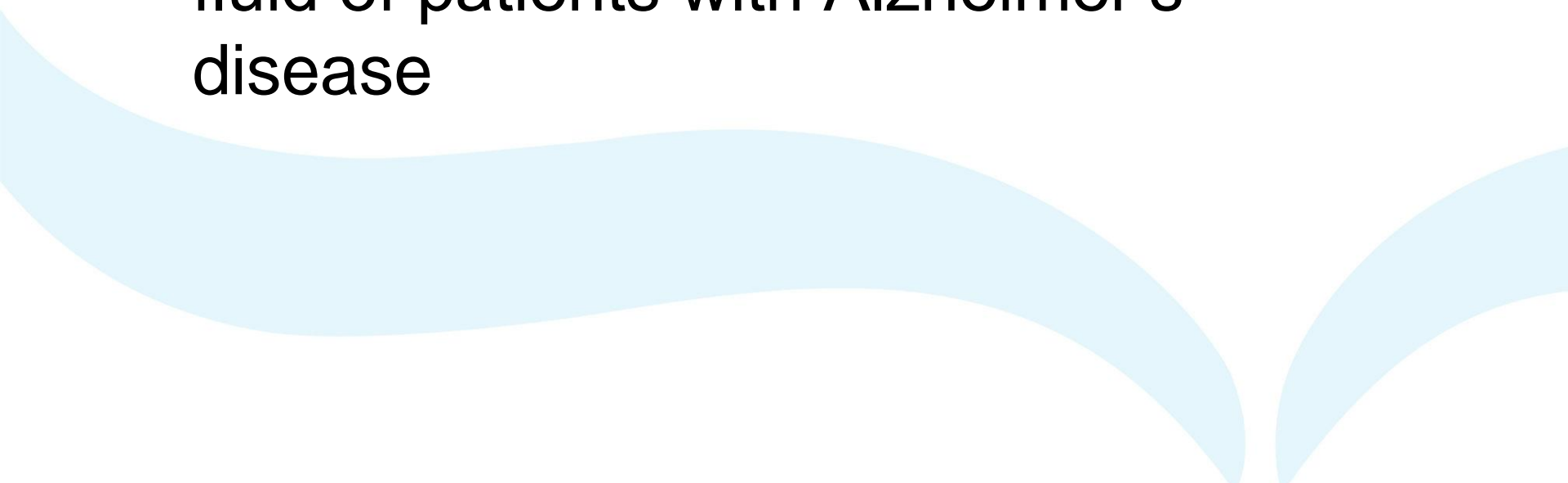
## Melatonin

- A further important component of circadian rhythm regulation
  - A hormone produced by the pineal gland in darkness and during sleep
- 

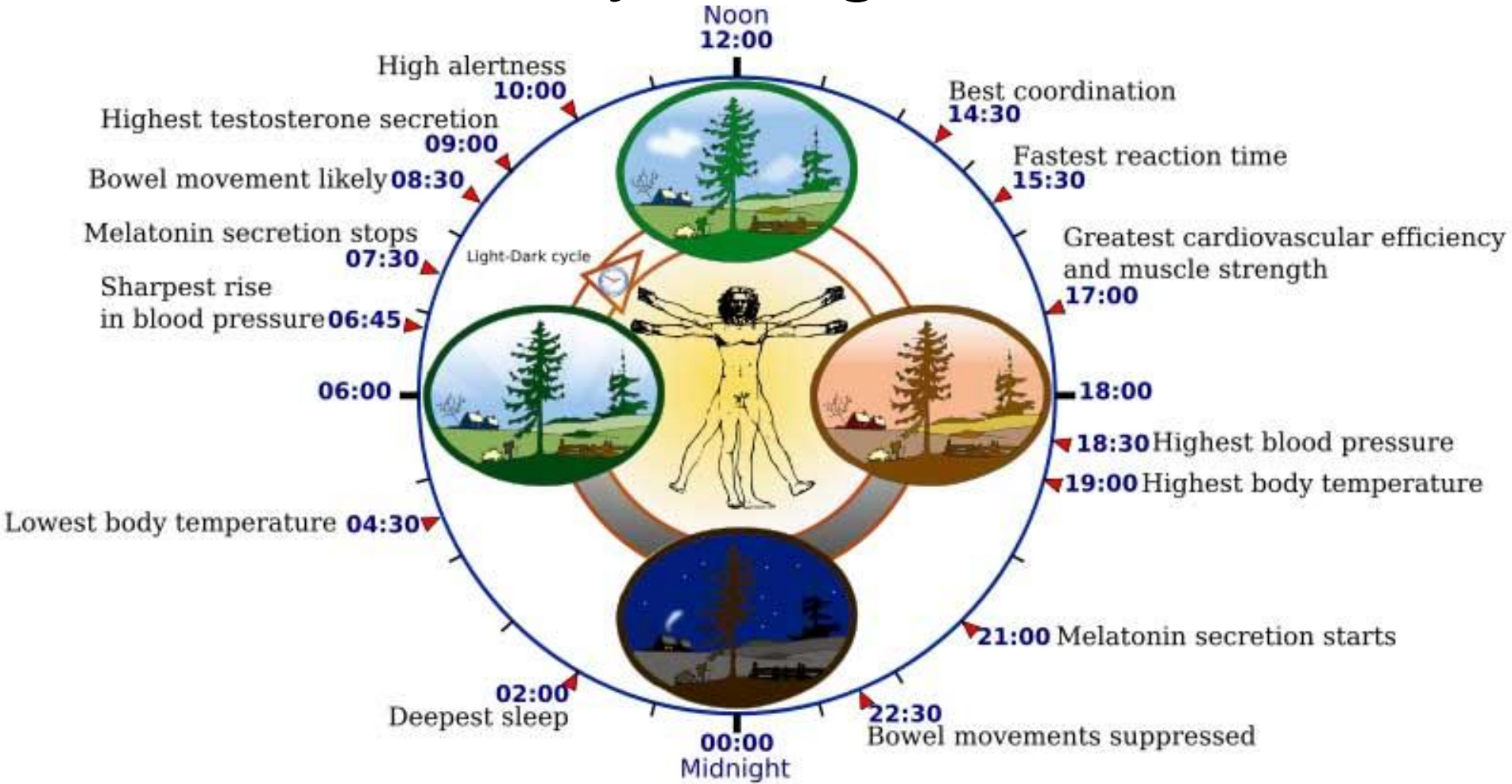


# Physiological

## Melatonin

- Melatonin level was found to be reduced in post-mortem cerebro-spinal fluid of patients with Alzheimer's disease
- 

# Physiological



# Physiological

## Sleep Disturbance

- Disturbances in duration and quality of sleep increase with aging, and occur in approximately 38% of persons over 65 year old (Cohen-Mansfield et al, 2003)
- Almost half of patients with dementia experience clinically relevant sleep-wake disturbances (Hess, 1994)

# Physiological

## Sleep Disturbance

- Subjective sleep disturbances in later life may potentially predict cognitive decline, and negatively correlate with cognitive performance (Jelicic et al, 2002)

# Physiological

## Sleep Disturbance

- REM-sleep disturbances, along with sleep apnoea and dysregulation of SCN, are among the suggested hypotheses for a possible physiological explanation of sundowning syndrome

# Physiological

## Sleep Disturbance

- Restless Leg Syndrome (RLS) and Periodic Leg Movement Syndrome (PLMS) may go undiagnosed in elderly demented patients due to their inability to describe their symptoms and these could be contributing to insomnia and subsequently sundowning symptoms

# Physiological

## Sleep Disturbance

- Periodic Leg Movement Syndrome (PLMS) can be a side effect of taking selective serotonin reuptake inhibitor (paroxetine, fluoxetine) , antipsychotic (clozapine (typical) or risperidone (atypical)), and other dopamine depleting medications (metoclopramide, haloperidol) which these patients may well be taking

# Physiological

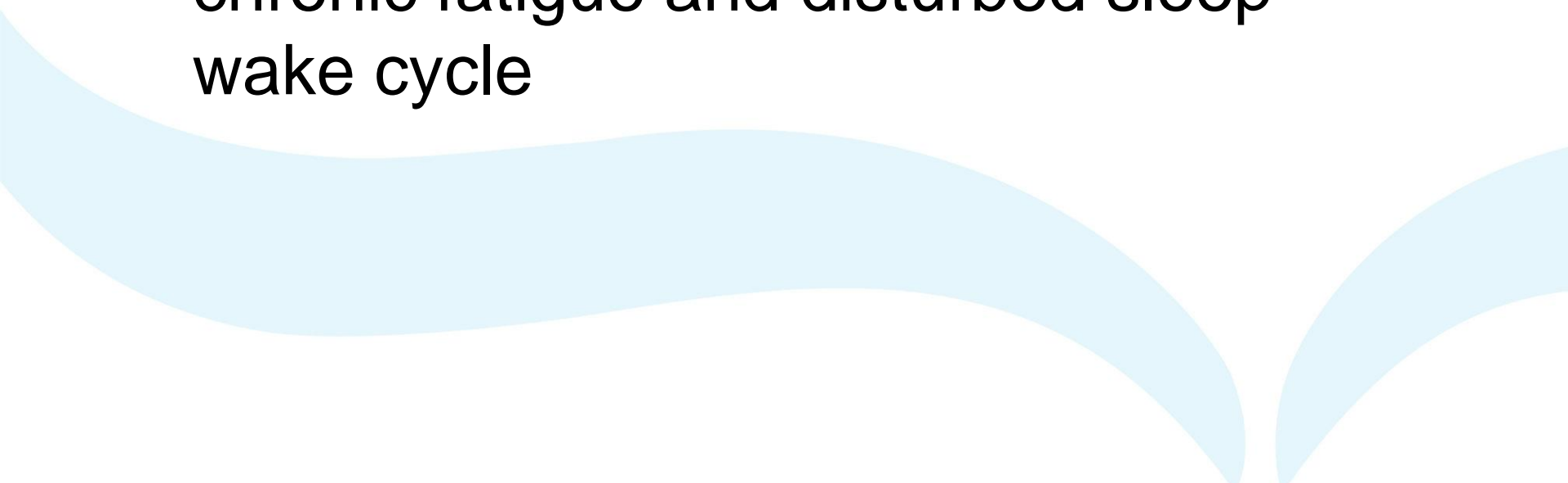
## Sleep Disturbance

- Bliwise et al (1993) found that awakenings after sunset time, spontaneous or related to nursing care, induced agitated behaviour more frequently in demented nursing home residents



# Physiological

## Sleep Disturbance

- Patient's confusion, as a manifestation of sundowning, may be a result of chronic fatigue and disturbed sleep-wake cycle
- 

# Environmental

- Afternoon fatigue
- Caregiver fatigue
- Overstimulation in the environment e.g. shift changes around 3pm
- High levels of morning and during the day activity may cause afternoon and evening fatigue leading to increased irritability and agitation

# Environmental

Lower staff-patient ratio or reduced availability of caregivers at home at this time of day leading to:

- Decreased intensity of structured stimulation
- Increased boredom
- Leading to agitation, restlessness and other behavioural disruptions/disorder

# Environmental

Results for carers at home:

- Inadequate, fragmented sleep
- Increased carer stress and burnout
- Leading to worsening sundowning potential
- Leading to hospitalization/institutionalization

# Other Contributing factors

## Medications

- ‘sundowning may well be a side effect or the “wearing off” effect of various medications’:
  - Antidepressants
  - Antipsychotics
  - Anti-parkinsonian
  - Anticholinergic
  - Hypnotics and Benzodiazepines

# Other Contributing factors

## Benzodiazapines and Hypnotics use in Sundowning:

- Poor drugs of choice
- Create drug tolerance
- Dependence
- Withdrawal
- Respiratory and CNS depression
- Paradoxical agitation
- Increase disinhibition and confusion (particularly if pre-existing agitation/sundowning syndrome)

# Other Contributing factors

## Medical and Psychiatric conditions

- Conditions causing pain (Bachman et al, 2006)
- Depression in patients with Dementia (Bacmman et al, 2006)
- Hunger, changes in blood glucose after eating in patients with diabetes, or a drop in blood pressure after a meal (temporarily deprives brain from oxygen), may bring on agitation and confusion in susceptible individuals (Margiotta et al, 2006)

# Diagnosis

Diagnosis is purely clinical, and characterized by a wide variety of cognitive, affective and behavioural abnormalities which all have temporal emergence or worsening in late afternoon, at evening, or at night



# Differential Diagnosis

## Delirium

- Delirium tends to be relatively acute in onset, relatively brief (a matter of hours or days), and fluctuating over the course of the day (not sharing the characteristic pattern of sundowning)

# Differential Diagnosis

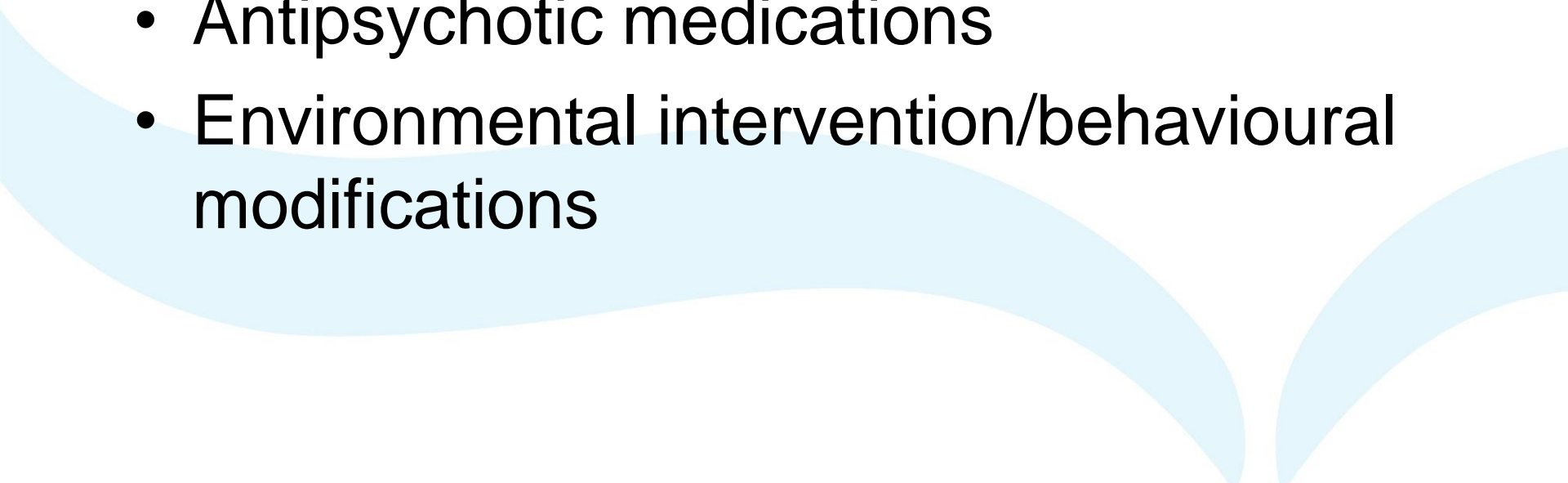
## Delirium

- Duckett (1993) states (in respect of differentiation between delirium and sundowning) Dementia may in fact be a necessary but not sufficient condition: not all demented patients sundown, but virtually all sundowning patients are demented, as well as delirious at time of their sundowning episode

# Treatment Approaches

S-M-A-R-T	P-I-E-C-E-S
Safety	Physical problems
Medical work-up	Intellectual/cognitive changes
Assessment of competency	Emotional problems
Rest/review of causes of behavioural abnormalities	Capabilities
Trial of medications	Environment
	Social/cultural issues

# Treatment Options

- Bright light therapy
  - Melatonin
  - Acetylcholinesterase inhibitors
  - Antipsychotic medications
  - Environmental intervention/behavioural modifications
- 

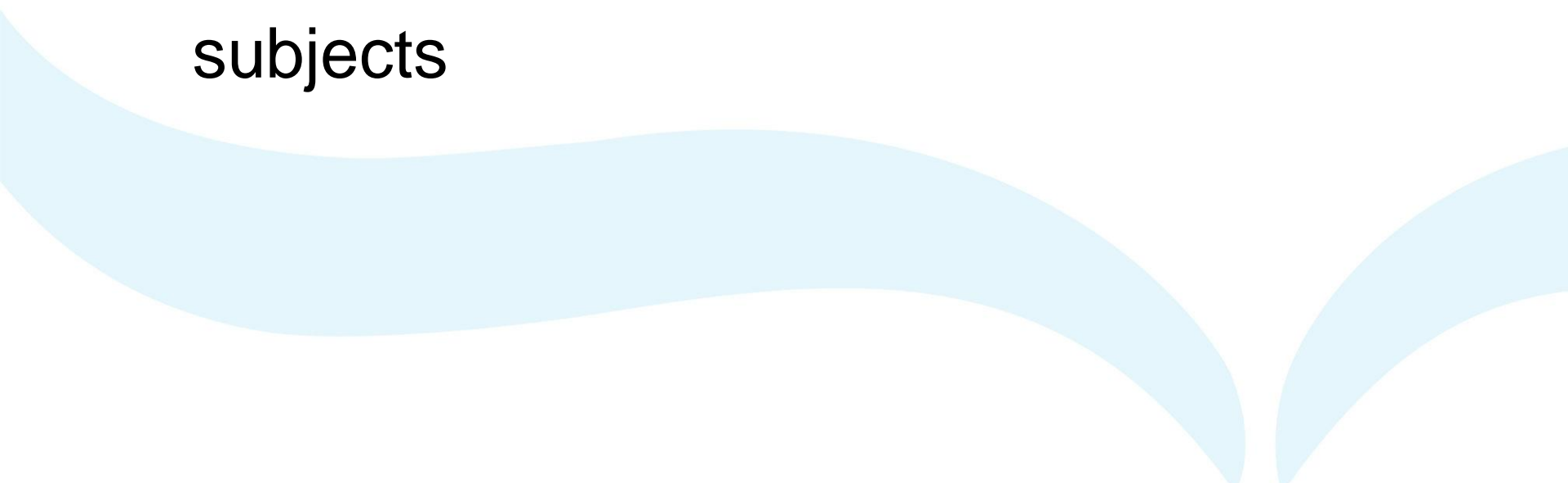
# Bright Light Therapy

- Full-spectrum fluorescent (2,550 – 5000 lux) one metre from SD patient for a couple of hours in the morning
- Turn light on while patient watching TV or attending to ADL (McGonigal-Kenny & Schutte, 2004)
- (with Melatonin) Positive effect on motor restlessness (Haffmans et al, 2001)
- Improved agitated behaviour (Lovell et al, 1995)

# Melatonin

- Two RCTs demonstrated remarkable improvement of agitation and other manifestations of sundowning syndrome
  - Five case series reported improvement in sundowning behaviour
  - Effect of Melatonin treatment on sleep quality and daytime functioning were inconclusive in the same literature review
- (Olde & Rigaud, 2001, Monti & Cardinali, 2000, Asayama et al, 2003)

# Melatonin

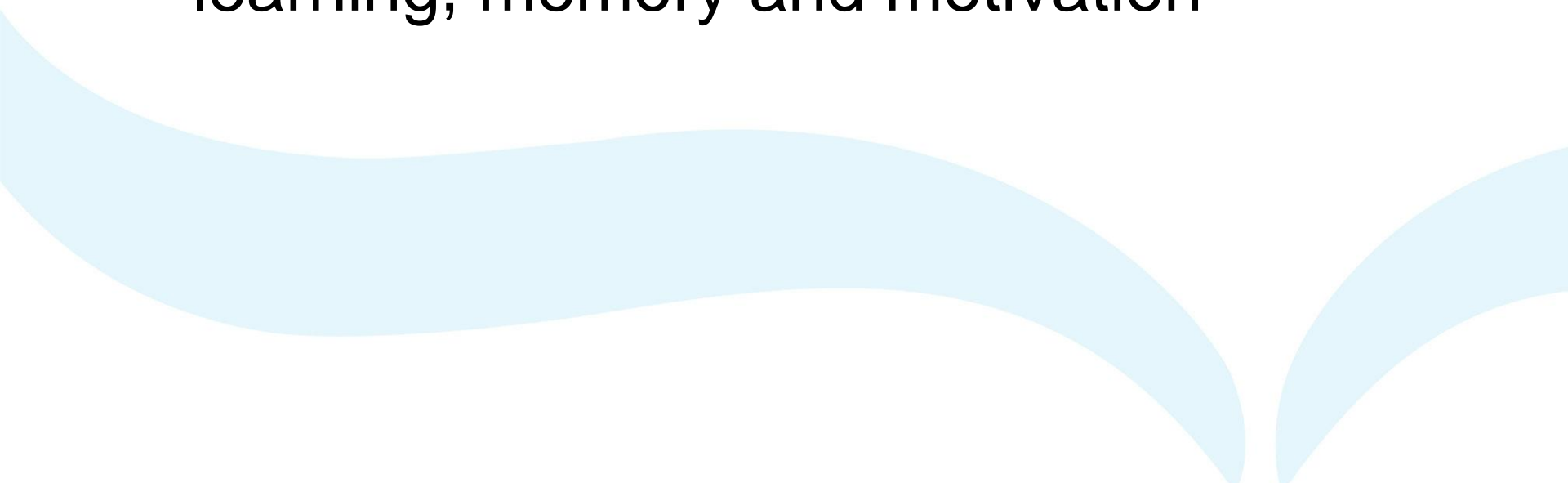
- Singer et al (2003) in a further double-blind placebo-controlled study did not find any benefits of melatonin for treatment of insomnia in studied subjects
- 

# Acetylcholinesterase inhibitors

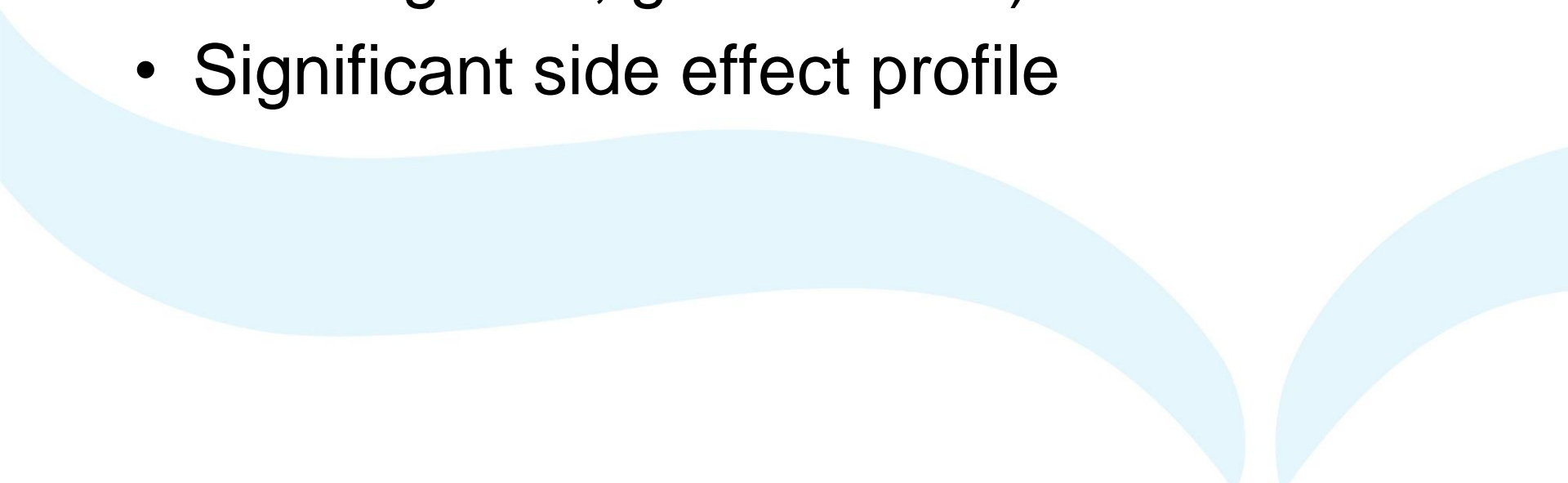
- These drugs are sometimes used for patients with Alzheimer's disease as they prevent the breakdown of the neurotransmitter, Acetylcholine
- Acetylcholine is the main neurotransmitter in the body and has functions in both the peripheral and CNS



# Acetylcholinesterase inhibitors

- Acetylcholine is released by motor neurones to activate muscles
  - Important role in arousal, attention, learning, memory and motivation
- 

# Acetylcholinesterase inhibitors

- No clear evidence of their benefit in controlling behavioural symptoms, including sundowning (Donepezil, Rivastigmine, galantamine)
  - Significant side effect profile
- 

# Antipsychotic medications

- Stoope et al (1995) reported that >40% of family practitioners and neuropsychiatrists in Germany considered antipsychotic medications to be the drug of choice for treating sundowning and other sleep disturbances in elderly demented patients

# Antipsychotic medications

- Numerous RCTs support their effectiveness for the treatment of behavioural symptoms in dementia (risperidone, olanzipine, aripiprazole)

# Antipsychotic medications

- The Clinical Antipsychotic Trials of Intervention Effectiveness – Alzheimer’s Disease demonstrated that use of atypical antipsychotic use was associated with marked improvement in paranoid ideations, aggression and anger (Sultzer et al, 2008)

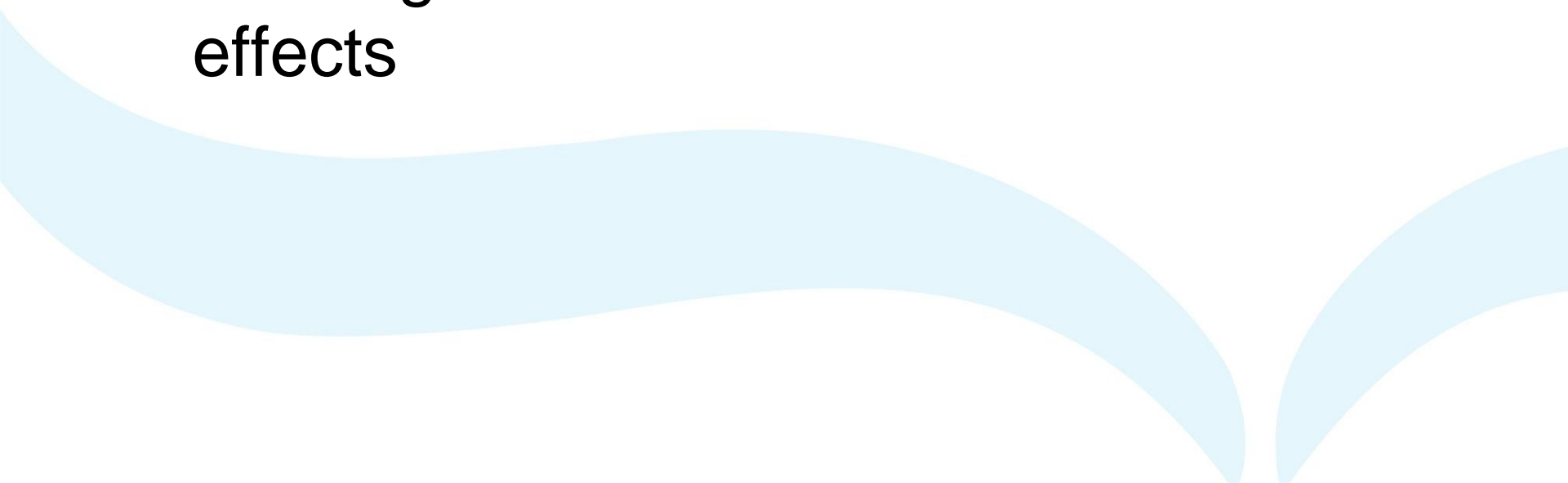
# Antipsychotic medications

- Tariot (2003) reports only modest effects on agitation in patients with severe dementia. Only 15-20% effect over placebo
- However, he also states that in a third of patients mild sedation may be experienced therefore may be helpful for sleep facilitation

# Antipsychotic medications

- Street et al (2000) also support benefit of use for various sleep disturbances and also maladaptive behaviours at night-time (Olanzapine)
- Improvement in day time agitation was also reported, with an ongoing benefit for four weeks after stopping antipsychotic medication (Straand et al, 2004)

# Antipsychotic medications

- Standbridge (2004) suggested atypical antipsychotics for treatment of sundowning and confusion in the evening due to their sedative side effects
- 



# Antipsychotic medications

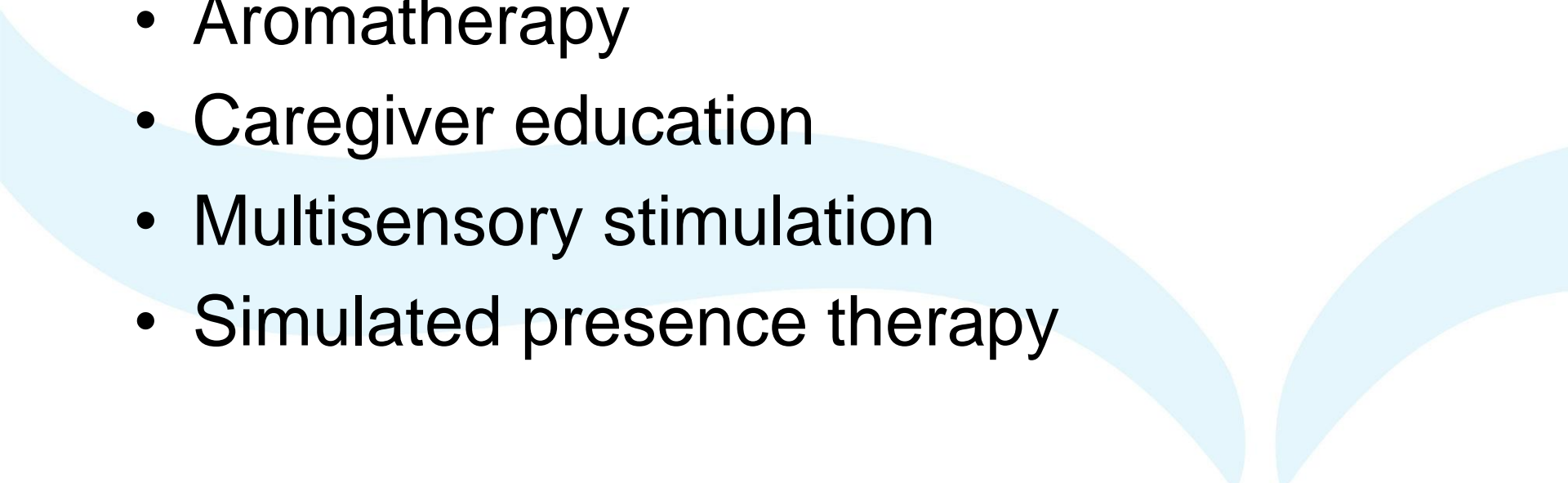
- Atypical antipsychotics have a lesser side effect profile to typical
- Their use needs to be weighed up against the life threatening side effects of pneumonia, stroke and death (Knoel et al, 2008, Sacchetti et al, 2008, Schneider et al, 2005)
- It is recommended that the cognitive and behavioural status of demented patients on antipsychotics should be reviewed on a 3-6 month basis (Standbridge JB (2004), Parnetti L, 2000)

# Environmental interventions/Behavioural modifications

- Non-pharmacological, individually tailored, approaches for behavioural disruptions, including sundowning, should be first-line therapy, and should be attempted before pharmacological interventions (Hermann & Gauthier, 2008, Salzman et al, 2008)

# Environmental interventions/Behavioural modifications

These approaches include:

- Light therapy
  - Music therapy
  - Aromatherapy
  - Caregiver education
  - Multisensory stimulation
  - Simulated presence therapy
- 

# Environmental interventions/Behavioural modifications

Other recommendations include:

- Good sleep hygiene routine
- Keeping occupied during the day
- Involve in simple routine tasks at normal times of distress
- Structured daily schedule
- Physical exercise

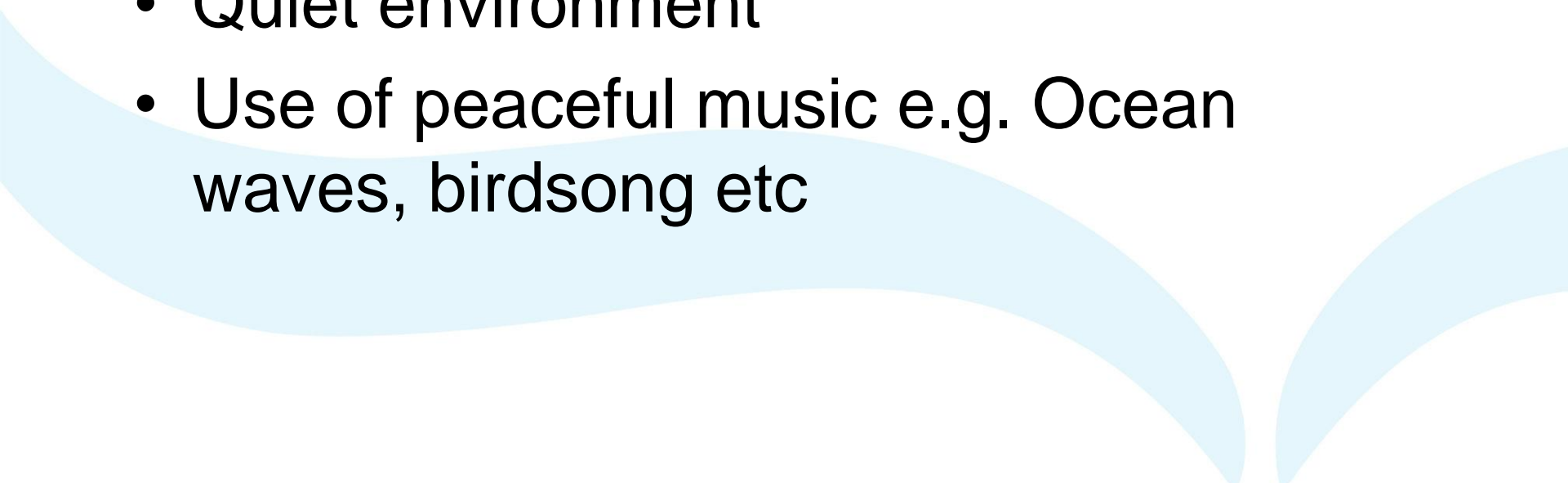
# Environmental interventions/Behavioural modifications

Other recommendations include:

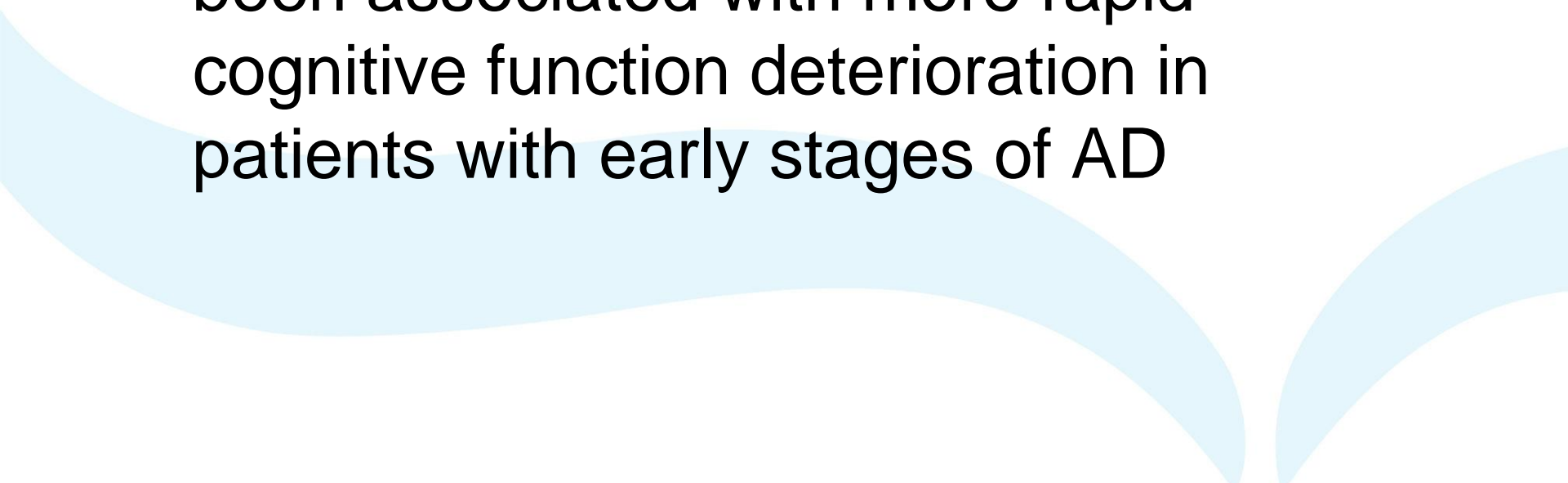
- Address physical needs including; pain, constipation, dyskinesias
- Redirection, reassurance & distraction
- Careful monitoring of television content as frightening/violent events may cause distress reactions as may be interpreted as happening to the individual

# Environmental interventions/Behavioural modifications

Other recommendations include:

- Ensure hunger and thirst are prevented or addressed quickly
  - Quiet environment
  - Use of peaceful music e.g. Ocean waves, birdsong etc
- 

# Prognosis

- Very little data
  - Scarmeas et al (2007) reported that the presence of sundown syndrome has been associated with more rapid cognitive function deterioration in patients with early stages of AD
- 

# Prevention

Exploration of aetiologic factors of sundowning syndrome (environmental, physiological, psychological) in each individual, as well as addressing modifiable factors with appropriate interventions, seems to be the best way to prevent clinical symptoms of sundowning