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Sleep problems in children with cancer

ผศ. ดร. อัจฉรียา ปทุมวัน

การประชุมวิชาการกองทุนโรคมะเร็งในเด็ก

เรื่อง “ความก้าวหน้าการรักษาโรคมะเร็งในเด็กในประเทศไทย”

วันเสาร์ที่ 29 มิถุนายน 2562



Topics for Today

- **What is sleep?**
- **Sleep in children with cancer**
- **Common sleep problems in children with cancer**
- **Causes & consequences of sleep problems**
- **Ways to improve/prevent sleep problems in children with cancer**



What is sleep?

- Sleep is a dynamic and regulated set of behavioral and physiological states during which many processes vital to health and well-being take place.





Sleep states—Normal Sleep

- Non-rapid eye movement (NREM) sleep
 - Stage 1 - twilight sleep
 - Stage 2 - light sleep
 - Stage 3 & 4 - deep sleep
- Rapid eye movement (REM)-dream

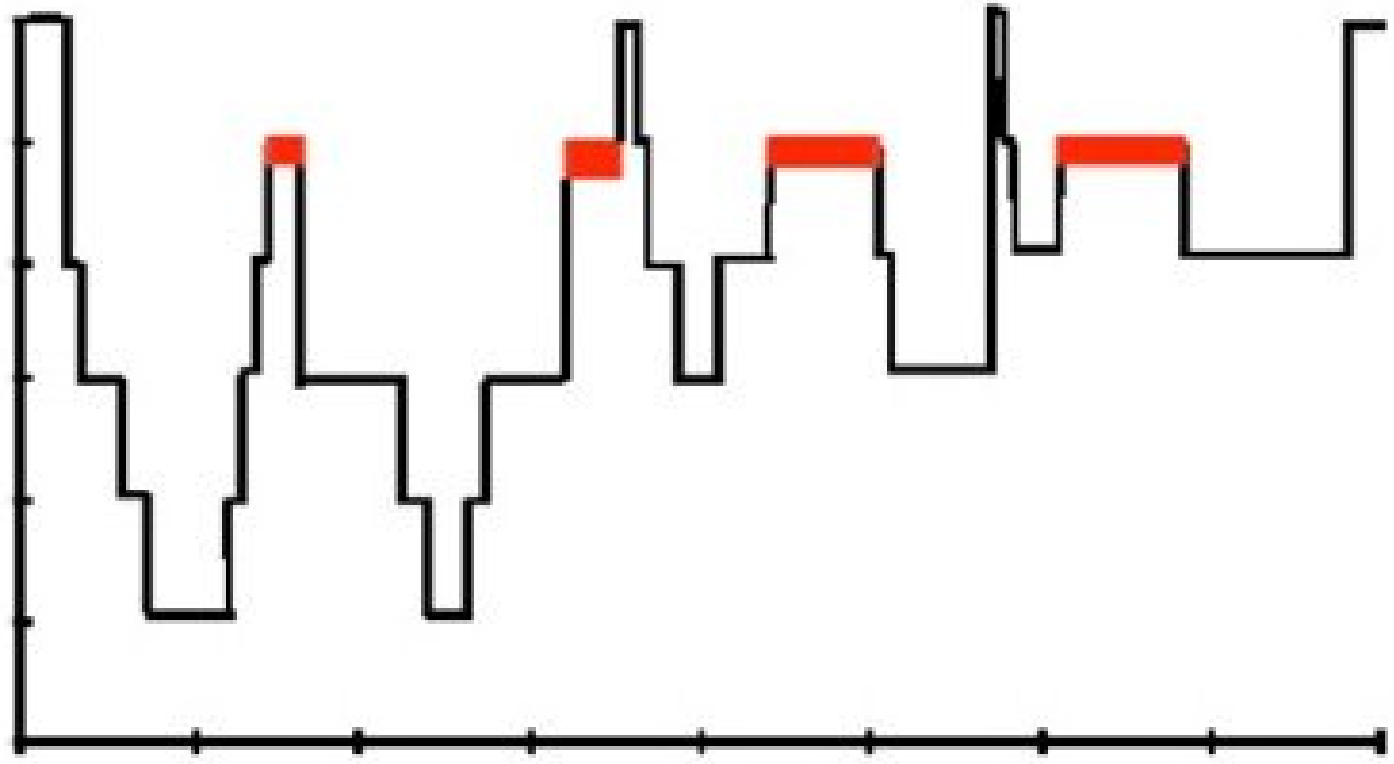
STAGES OF SLEEP

REM

1
2
3
4

1 2 3 4 5 6 7 8

HOURS OF SLEEP





Two Processes:

- Sleep Drive (homeostasis)
- Biological Clock (circadian rhythm)



Current Theory Suggests a 2-Process Model of Sleep/Wake Regulation

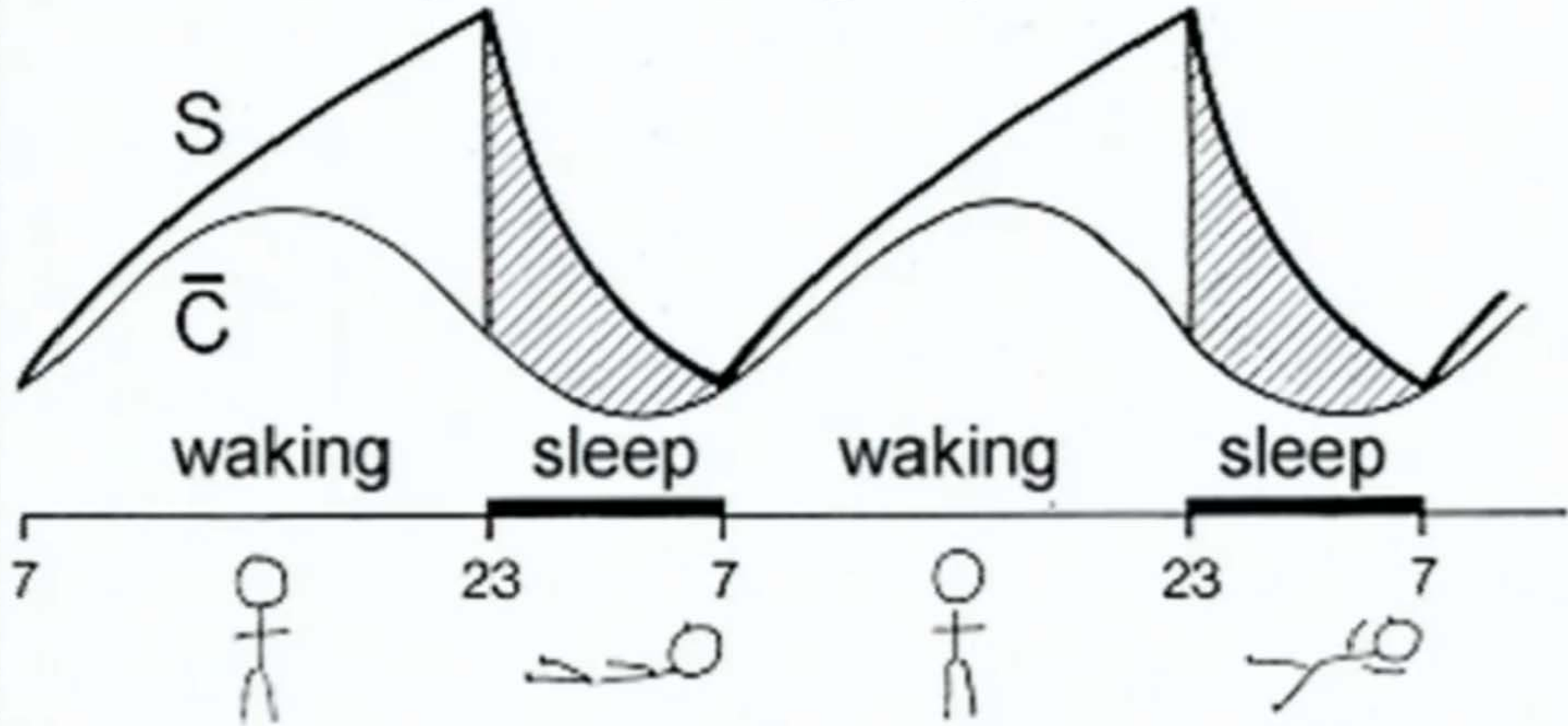
1 Sleep homeostasis

- Process S ทำให้เกิดความ ต้องการที่จะหลับของร่างกาย หรือแรงขับของร่างกายที่จะ หลับ จะแปรผันตามจำนวน ชั่วโมงที่ตื่น
- “Sleep pressure”
- “Sleep drive”

2 Circadian rhythms

- Process C ทำหน้าที่ควบคุม วงรอบของการหลับตื่นไปพร้อมๆ กับเวลาของสภาพแวดล้อมนั้นๆ เช่น วงจรของความสว่าง-ความ มืด การปฏิสัมพันธ์กับ สิ่งแวดล้อม เป็นต้น
- “Wake drive”

Sleep-wake cycle



Normal sleep in children and teens



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Recommended Amount of Sleep for Pediatric Populations*

Age	Recommended Sleep Hours per 24 Hour Period
Infants: 4 to 12 months	12 to 16 hours (including naps)
Toddlers: 1 to 2 years	11 to 14 hours (including naps)
Preschoolers: 3 to 5 years	10 to 13 hours (including naps)
Gradeschoolers: 6 to 12 years	9 to 12 hours
Teens: 13 to 18 years	8 to 10 hours

*The American Academy of Pediatrics (AAP) has issued a Statement of Endorsement supporting these guidelines from the American Academy of Sleep Medicine (AASM).

Source: Paruthi S, Brooks LJ, D'Ambrosio C, Hall W, Kotagal S, Lloyd RM, Malow B, Maski K, Nichols C, Quan SF, Rosen CL, Troester MM, Wise MS. Recommended Amount of Sleep for Pediatric Populations: A Statement of the American Academy of Sleep Medicine. *J Clin Sleep Med.* 2016 May 25. pii: jc-00158-16. PubMed PMID: 27250809.

จำนวนชั่วโมงการนอนหลับ ที่เหมาะสม



คัดลอก! Sleep duration recommendations: มาจาก National Sleep Foundation



Newborn and Infant Sleep

- Newborn sleep has 2 stages;
50% “quiet or non-rapid eye movement (NREM) sleep” and
50% “active or rapid eye movement (REM) sleep”
- Total sleep time = 16 to 17 hours / 24 hour period with frequent awakenings for feeding and nurturing



Children Ages 1-5 Years

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- Amount of total sleep time decreases to ~11 to 13 hours / 24 hour period
- Generally sleep through the night
- Nap during the day as needed





Sleep in Middle Childhood (5-12 years)

- Total sleep time 10-12 hours
- Typically awoken briefly approximately 4-6 times each night at the completion of each sleep cycle.
- May experience *parasomnias* (sleep problems) such as enuresis (bedwetting), nightmares, and sleep walking



Sleep in Adolescents (12-18 years)

- Need ~9 hours of nightly sleep for optimal health, emotional well being, and cognitive functioning
- Often experience delayed sleep phase syndrome can't go to sleep until late at night and prefer to sleep later in the morning
- Frequently do not get sufficient sleep



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Sleep Problems in Children with Cancer



Sleep Disturbances

- Among most common symptoms of cancer patients
- 30-50% report sleep problems post-treatment
- Higher during active cancer treatment
- 2-3 times higher than in general population



Sleep Disturbances

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- School-aged children experienced limited sleep cycles due to a variety of environmental conditions, such as sound and light, as well as clinical care interruptions (ie, medication dosing) (Linder et al., 2012)
- Youth with CNS tumors are at increased risk for poor sleep quality, difficulties in initiating and maintaining sleep, daytime sleepiness, and fatigue compared with youth with non-CNS malignancies and healthy peers. (Verberne et al. 2012; Meeske et al. 2004; Crabtree et al. 2015)



Common Sleep Problems

- นอนยาก ใช้เวลานานกว่าจะเริ่มหลับได้
- นอนไม่ต่อเนื่อง
- ตื่นบ่อยกลางดึก
- ตื่นแล้วไม่หลับ
- ตื่นเช้าเกินไปทำให้นอนไม่พอ



EDS in Children with Cancer

- Excessive daytime sleepiness (EDS) was the most common sleep problem, seen in 60% of children with cancer and in 80% of children with brain tumors involving the hypothalamus, thalamus, and brainstem. (Rosen & Brand, 2011)

Sleep Dysfunction due to Medical Therapy



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- Pediatric patients receiving dexamethasone for ALL have fewer actual sleep minutes, stay in bed longer, but have poorer sleep quality than well children, children, with chronic illnesses, or pediatric patients hospitalized for illnesses other than cancer. (Hinds et al, 2007)

Sleep Dysfunction due to Medical Therapy



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- High dose CRT (mean dose 40.3 Gy) in childhood is associated with objective (actigraphy) and subjective (questionnaires) changes in the sleep-wake rhythm in adulthood. (van Someren et al.2004)

CRT=Cranial Radiation Therapy



Insomnia in Children with Cancer

- Among the children with leukemia or other hematologic cancers, insomnia was the most common sleep problem, present in 39% (vs. 17% in brain tumors). (Rosen & Brand, 2011)
- In children <10 years of age, insomnia was generally mild and was attributed to poor sleep hygiene (สุขอนามัยการนอนหลับ) (Rosen & Brand, 2011)

Review

A systematic review of sleep in hospitalized pediatric cancer patients

Soeun Lee¹, Gaya Narendran², Lianne Tomfohr-Madsen^{3,4} and Fiona Schulte^{4,5,6,7*}

¹*Department of Psychology, University of Guelph, Guelph, ON, Canada*

²*Cumming School of Medicine, University of Calgary, Calgary, AB, Canada*

³*Department of Psychology, University of Calgary, Calgary, AB, Canada*

⁴*Alberta Children's Hospital Research Institute, Calgary, AB, Canada*

⁵*Haematology, Oncology, and Blood and Marrow Transplant Program, Alberta Children's Hospital, Calgary, AB, Canada*

⁶*Department of Paediatrics, University of Calgary, Calgary, AB, Canada*

⁷*Department of Oncology, University of Calgary, Calgary, AB, Canada*

Objective: The purpose of this systematic review was to describe the occurrence of sleep disruptions in pediatric cancer patients and to identify and discuss the factors related to the hospital sleep environment that may be associated with disturbed sleep.

Methods: A total of 108 articles were located in five databases (PubMed, PsychINFO, Medline, CancerLit, and Google Scholar), and seven met our inclusion criteria and formed the basis of this review.



Results

Participant characteristics

- 147 participants (Age ranged from 1 -18 years)
- Male (47.9%); Female (52.1%)
- Were in active chemotherapeutic treatments.
- In one study, participants were receiving IV antibiotic treatment for febrile neutropenia.



Results

Sleep measures used

- Unvalidated self-report measures
- Numeric rating scales
- Indirect measures of sleep (e.g., inclusion of sleep in a QOL questionnaire)
- Parent-report sleep diaries
- Wrist actigraphy



Sleep disruptions in the hospital

- Data from objective and subjective assessments of sleep showed that child sleep was disrupted in the hospital when compared to previously established age-related norms.



Sleep disruptions in the hospital

Table 4. Reported actigraphic total sleep time, sleep efficiency, sleep onset latency, nighttime awakenings, and wake after sleep onset

Participant population	Age (range, mean)	Total sleep time (min)	Sleep efficiency (%)	Sleep onset latency (min)	Nighttime awakenings	Wake after sleep onset (min)
Hinds (2007) [20]	7–18, 12.48	582.08	—	—	15.32	—
Hinds (2007) [21]	7–18, 12.48	582.08	72.01	—	—	—
Linder (2012) [18]	5–12, 8.8	457.70	—	—	11.37	—
Linder (2013) [19]	5–12, 8.8	527.72	87.85	12.57	12.36	74.77
Age-related norms	5–12	600.00–660.00	90% is 'acceptable'	<20	4–6	<20

*Note. Age-related norms were reported in Linder & Christian (2013).



Environmental factors contributing to disrupted sleep in the hospital

- Noise, light levels, and staff room interruptions were associated with decreased total sleep minutes and increased nighttime awakenings.



Objective results

- Nighttime sound levels in the patients' rooms were found to be **10 dB greater than recommended sound levels by the World Health Organization (WHO)** for hospitalized patients who are being actively treated, with noisier hospital rooms being significantly associated with decreased sleep quantity.
- On average, nighttime sound levels in pediatric cancer patients' rooms **> 45 dB**, with abrupt sound increases of **80 dB** in some patients' rooms.

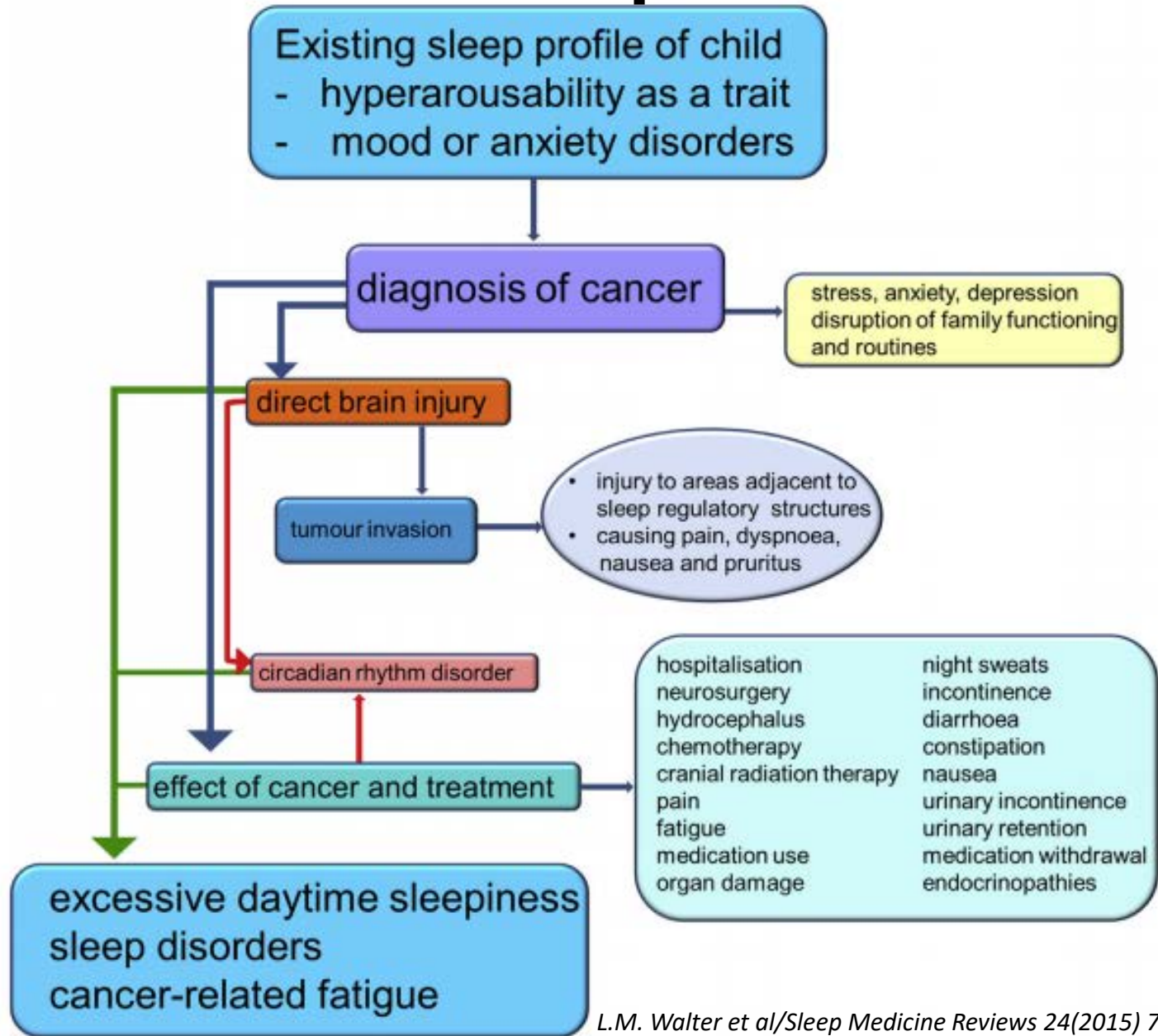


Self-reported results

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- Parents viewed the hospital sleep environment, especially loud noise levels, as a disruptor to their child's sleep.
- *"She gets less sleep as the interruptions are many because of the IV pump going off, blood pressure and temperature being taken."*

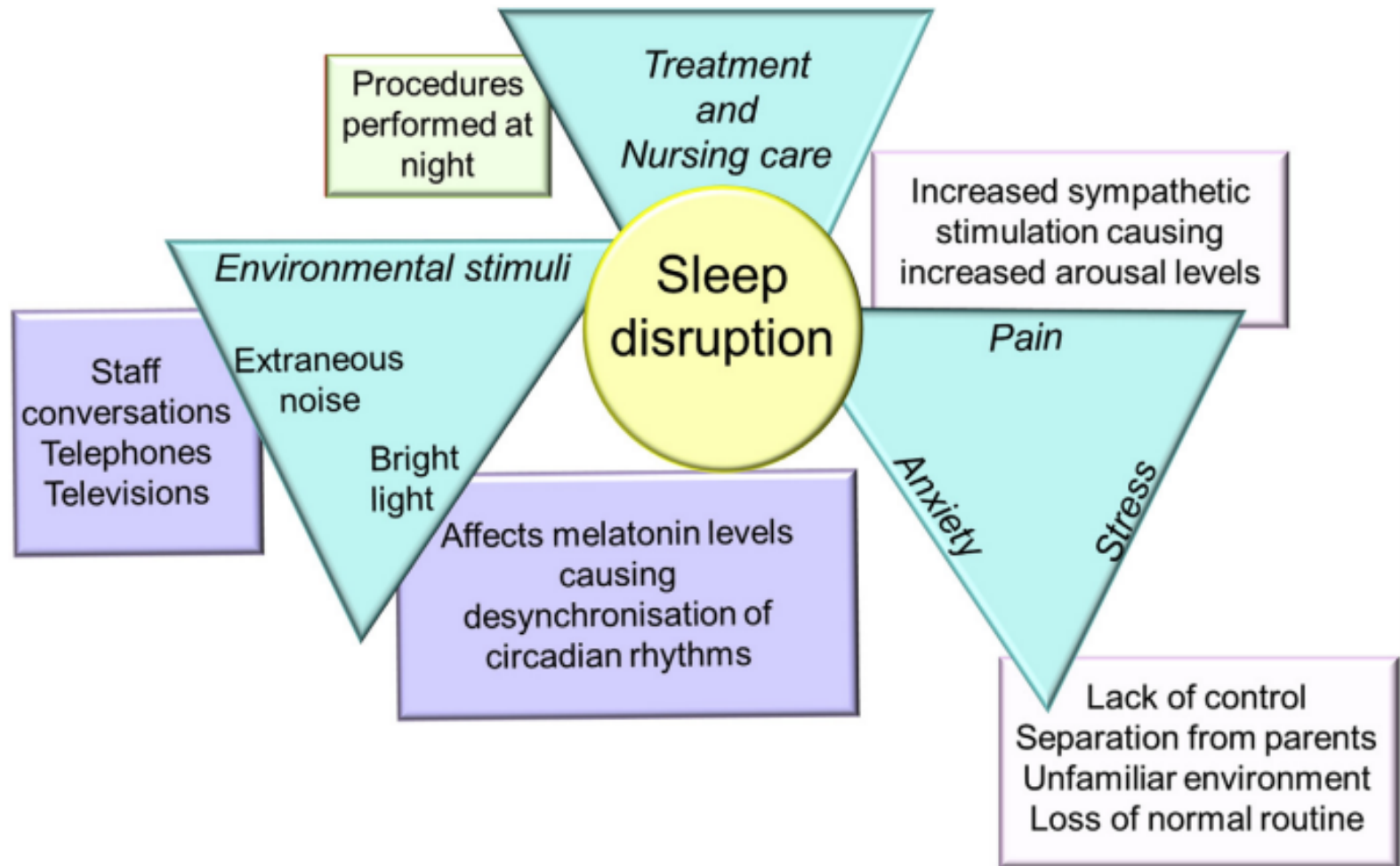
The Causes of Sleep Problems



Causes of Sleep Disruption in the Hospital Environment for Child with Cancer

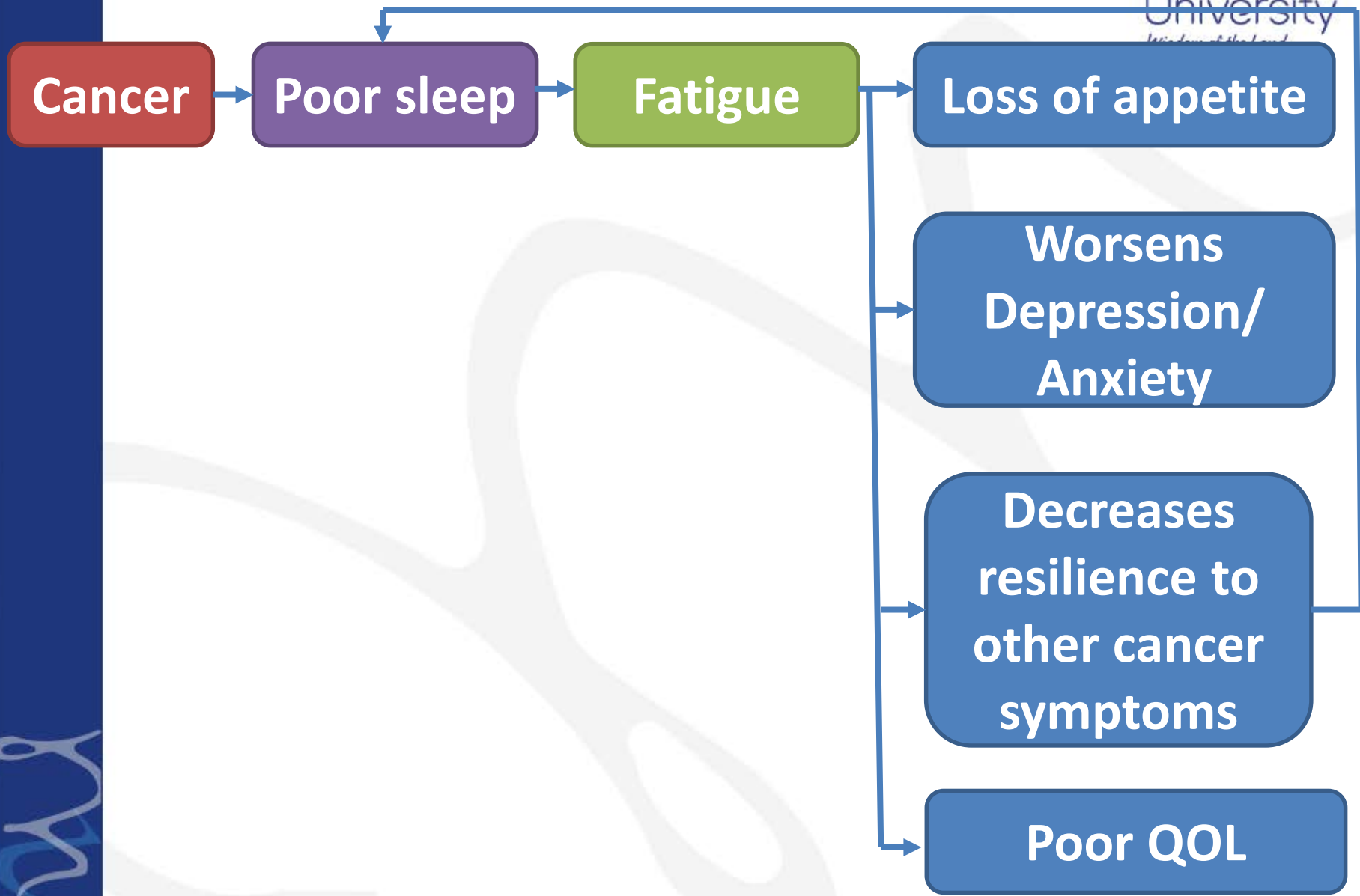


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Consequences of sleep problems



Promoting Sleep in Children with Cancer



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- Assess sleep patterns and sleeping environment
- Implement nursing interventions to promote adequate sleep
 - Manage pain, stress, anxiety, treatment side effects (N/V)
 - Limit the number of room entrances and exits
 - Optimal timing for medication and nursing care





Promoting Sleep in Children with Cancer

- Educating hospital staff
- Educating clinicians in outpatient clinics
- Providing anticipatory guidance to parents on the myriad factors that can place children at risk for sleep problems can be the first step in prevention.



To Get a Good Night's Sleep - Practice Good Sleep Hygiene!

- เข้านอนตื่นนอนเวลาเดียวกันทุกวัน
- หลีกเลี่ยงการงีบหลับกลางวันหลัง 3pm. (Limit naps to < 1 hour) ในเด็กเล็ก จัดให้มีตารางการงีบหลับกลางวัน
- ควรกำหนดระยะเวลาการนอนหลับให้สม่ำเสมอ
- มีสิ่งกระตุ้นจากภายนอก (e.g. light-dark cycle) ห้องนอนควรจะมีมืด ไม่มีเสียงรบกวน ได้รับแสงแดดตอนตื่นนอนเช้า)



To Get a Good Night's Sleep - Practice Good Sleep Hygiene!

- หลีกเลียงแสงเข้าตา ไม่ควรดู TV, เล่น computer, tablet, มือถือ ในห้องนอน
- รับประทานอาหารตรงเวลา
- หลีกเลียงเครื่องดื่มที่มีคาเฟอีน ได้แก่ ชา กาแฟ น้ำอัดลม
- หลีกเลียงอาหารมื้อหนัก และการออกกำลังกายอย่างหนักก่อนนอน



Sue Zupanec, MN, NP-Peds
Heather Jones, MN, NP-Peds
Lyndsey McRae, RN, BScN
Efrosini Papaconstantinou, RN, PhD
Julie Weston, RN, MSc
Robyn Stremler, RN, PhD

A Sleep Hygiene and Relaxation Intervention for Children With Acute Lymphoblastic Leukemia

A Pilot Randomized Controlled Trial

Source: Zupanec et al. Cancer Nursing 2017, 40(6): 488-496.



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**THANK YOU FOR YOUR
ATTENTION !**

