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Welcome to The Conway Chair Conversation!

October 6, 2020

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Division of Nursing
Center for Continuing Education

Provider Unit Disclosure

"The Conway Chair Conversation" Education

Notice of Requirement for successful completion

Attend the entire program. At the conclusion of the program, you will have access the evaluation link and CNE certificate. The active link is available in the chat box. Complete the evaluation, you will then be taken to your certificate where you will need to insert your first and last name before you print CNE your certificate. Be sure to print your certificate before you close the application. The evaluation link will be closed following this activity.

Conflict of Interest

The planning committee and presenter have no conflicts of interest.

Commercial Support

This Continuing Nursing Education Activity is not receiving commercial support.

The Purpose of the Conway Chair Conversations

Join Us for

Conway Chair Conversations

Date: Tuesday, October 6, 2020
Location: **Zoom Room**
Time: 12:30 pm – 1:30 pm
childrensnational.zoom.us/j/328055554

The **Conway Chair Scholars** join

Dr. Nathan Dean & Dr. Val Rogers

engage participants in a conversation about:

"Is it Possible to Protect the Sleep of Hospitalized Children?"

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Is it Possible to Protect the Sleep of Hospitalized Children?

Dr. Nathan Dean: can we protect sleep in the PICU?

Dr. Pam Hinds: can we protect sleep in the BMT unit?

Dr. Val Rogers: can we tell if we have protected patients' sleep?

Mr. Jurran Wilson: can we tell from documentation if we have protected patients' sleep?

Dr. Danny Lewin: does it matter if sleep for children and adolescents is protected? Do hospital schedules allow us to do this?

Imagine You Are a Patient in the ICU at Night

- 8 pm: pupillary check, pulse ox site change, BP cuff site change, RN beginning of shift assessment
- 1o pm: IV antibiotic administered, albuterol treatment
- 12 am: pupillary exam, pulse ox site change, BP cuff site change
- 12:30 am: bath and weight measured
- 1 am: foley care
- 2 am: albuterol treatment, NG medication administration
- 4 am: pupillary check, pulse ox site changed, BP cuff site change trach ties cleaned
- 4:30 am: routine AM x-ray
- 5 am: mouth care
- 6 am: Linen cart changes, trash cans emptied, IV medication administration, NG medication administration
- 6:30 am: MDs/NPs/PAs begin their morning assessments

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Why Should We Protect Sleep?

- Impaired sleep → Delirium
- Delirium and Sleep are a focus of the Society of Critical Care Medicine's ICU Liberation bundle
  - Multi-institutional study of 15,000 patients demonstrated high bundle compliance was associated with
    - decreased mortality
    - decreased days of mechanical ventilation
    - decreased delirium
    - increased discharge to home
- Delirium is associated with increased hospital cost
  - >$500 million per year in the US*

*Traube C et al. Cost associated with pediatric delirium in the ICU. *Crit Care Med* 2016

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Project Aim

Increase percentage of nights (11 pm to 5 am) without awakenings for routine tasks*

*Routine tasks= X-rays, baths, weights, foley care, trach changes, administration of BID/Q12 hr meds, and central line dressing changes

In PICU patients eligible for level 2 or greater Early Mobilization**

** EM ≥2 = PICU LOS >72 hrs and no contraindications (ICP >15 mmHg, current PEEP >10, current FiO2 >60%, neuromuscular blockade drip, or on >/=2 inotropic medications)

from 27% to 60%

by March 1st, 2020 and continue to increase to 80% by July 1st, 2020.

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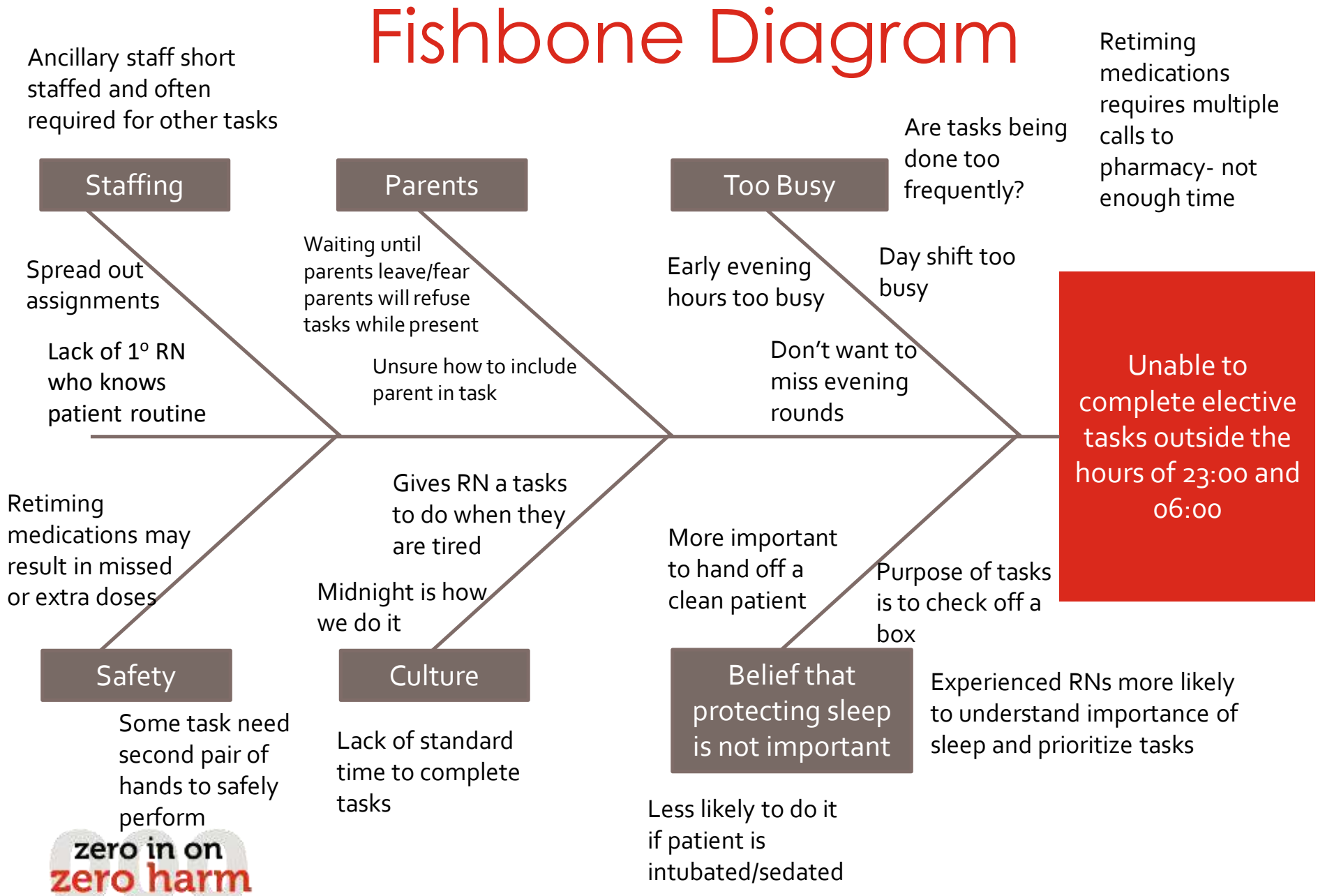
Fishbone Diagram



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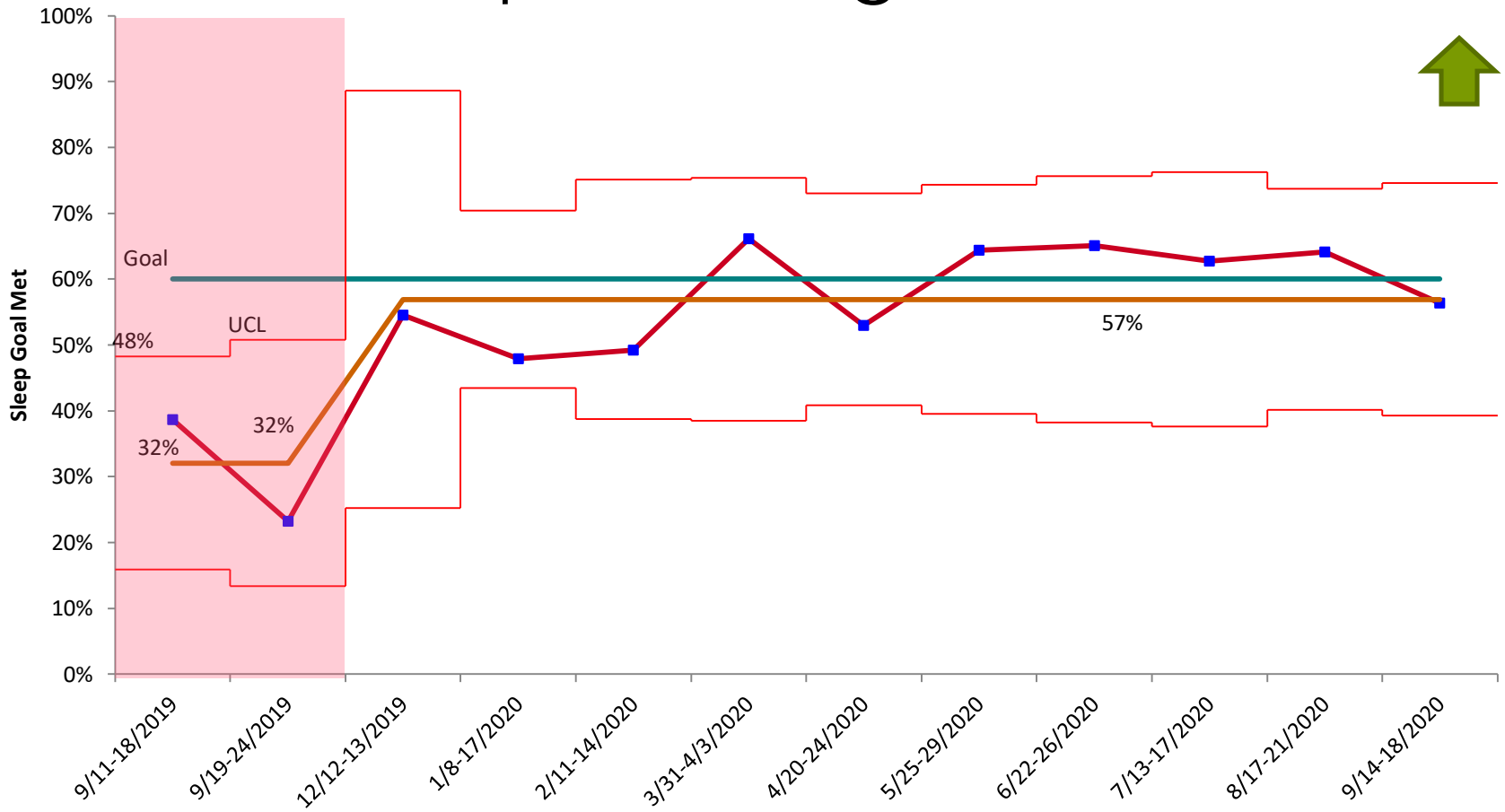
Protecting Sleep (p-chart), n= 835 patient nights



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Next Steps

- Eliminating pupillary checks while asleep for non- Neurocritical Care patients
- Re-evaluating patients receiving nebulized treatments during protected hours
- Spacing pulse ox and BP cuff site changes and mouth care to 3 times a shift and avoid protected hours
- Actigraphy: objectively measure quality of sleep

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Can We Protect Sleep of BMT Patients?

Children and adolescents in treatment for medulloblasoma receiving intensive chemotherapy and stem cell rescue hospitalized for 5 to 7 days.

Sleep disturbances and fatigue in these patients are secondary to treatment and environmental factors. Outcomes of these symptoms are dysphoric mood, reduced quality of life and diminished immune system

proinflammatory cytokines of IL-6 and TNF-a affected. Previous studies of

disturbed sleep and fatigue in pediatric cancer patients indicates that the two symptoms are not

directly influencing each other until both reach high levels.

Can We Protect Sleep of BMT Patients?

What we knew from our previous studies:

- Children hospitalized for routine course of chemotherapy experienced up to **40 night awakenings**
- Sleep efficiency below acceptable levels (<75%)
- Unlikely to participate in preventative physical activity or therapy

What we learned from the BMT Study:

- **37 patients** enrolled in a protocol BTSLEP – all wore wrist actigraphs and completed sleep and fatigue age-specific measures (M=9.6 Y, SD=4.2Y)
- **19 randomized** to the intervention (90 minutes of protected sleep with bundled nursing care, stimulus control, darkened room and white noise if desired, nighttime rituals, covered windows to the hallway); **18 randomized to usual care**

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Can We Protect Sleep of BMT Patients?

- **Parent Reports from the Intervention Arm**: 'best hospital night sleep ever'
- **Actigraphy by study arm:** no difference between the two arms
- **Actigraphy total group:** children with average risk had better sleep (more, more efficient) than high risk patients but no one had sufficient sleep, prolonged time to get to sleep, high number of awakenings and poor sleep efficiency (<72% for children; <68% for adolescents)

Is it Possible to Protect the Sleep of Hospitalized Children?

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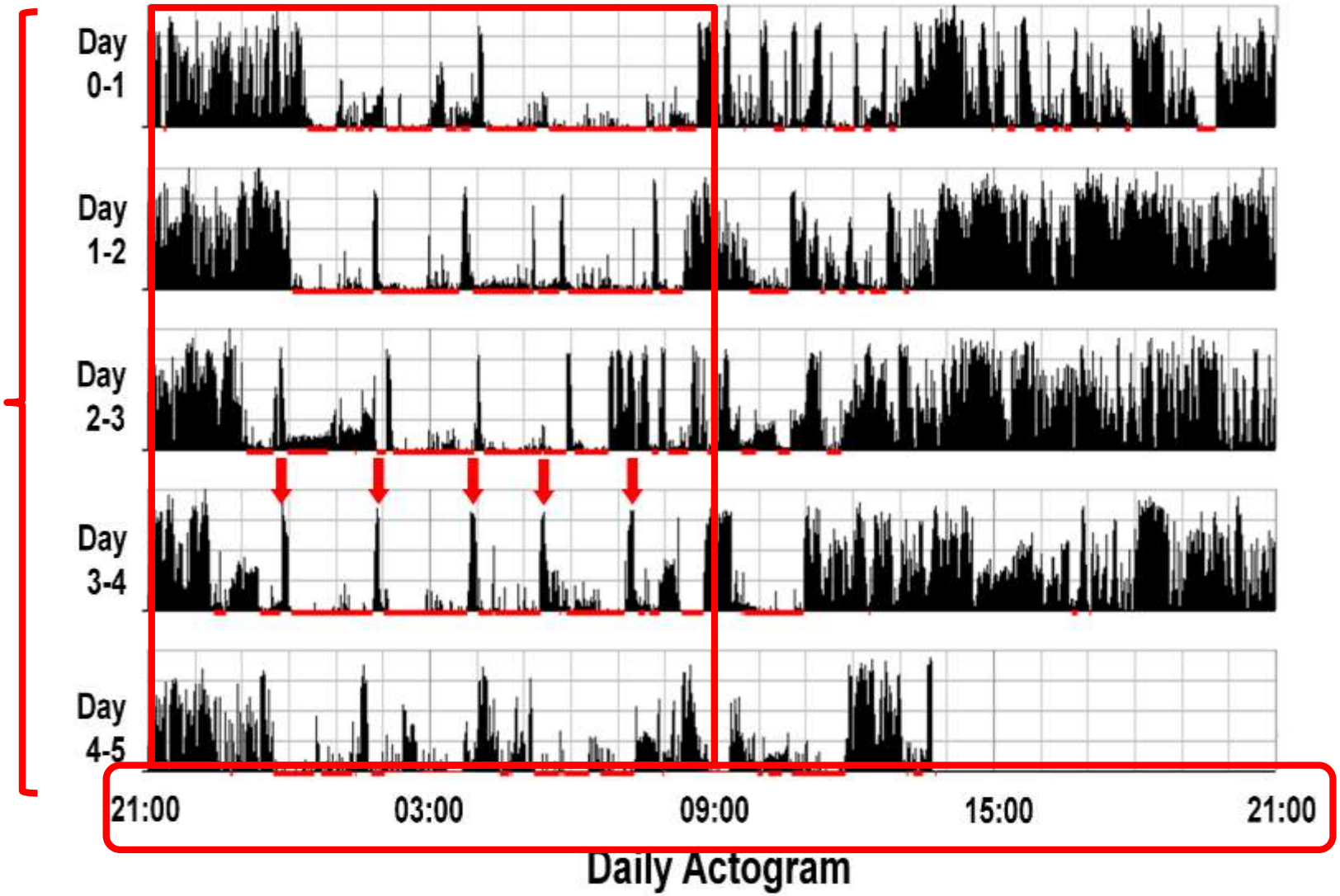


Rogers VE, Zhu S, Ancoli-Israel S, Liu L, Mandress BN, Hinds PS. A pilot randomized controlled trial to improve sleep and fatigue in children with central nervous system tumors hospitalized for high-dose chemotherapy. Pediatric Blood & Cancer 2019; 61: 1986-1991.

TABLE 2 Sleep in hospitalized children with CNS cancers undergoing high-dose chemotherapy and comparison with age-group recommendations

	Full sample, $N = 33$	Preschoolers, $n = 7$	School-age, $n = 20$	Teens/young adults, $n = 6$
[a]Total sleep time (min)	537.5 ± 130.9	508.3 ± 128.7	545.7 ± 129.3	544.3 ± 157.1
[a]Total sleep time (h)	8.96 ± 2.2	8.5 ± 2.1	9.1 ± 2.2	9.1 ± 2.6
Recommended minimum 24-h sleep[28]	N/A	10 h (600 min)	9 h (540 min)	8 h (480 min) teens, 7 h (420 min) young adults
[b]Sleep difference (min)	2.46 ± 139.3	91.7 ± 128.7	−5.7 ± 129.3	−74.3 ± 149.1
Achieved minimum sleep recommendation (%)	48.5	14.3	55.0	66.7

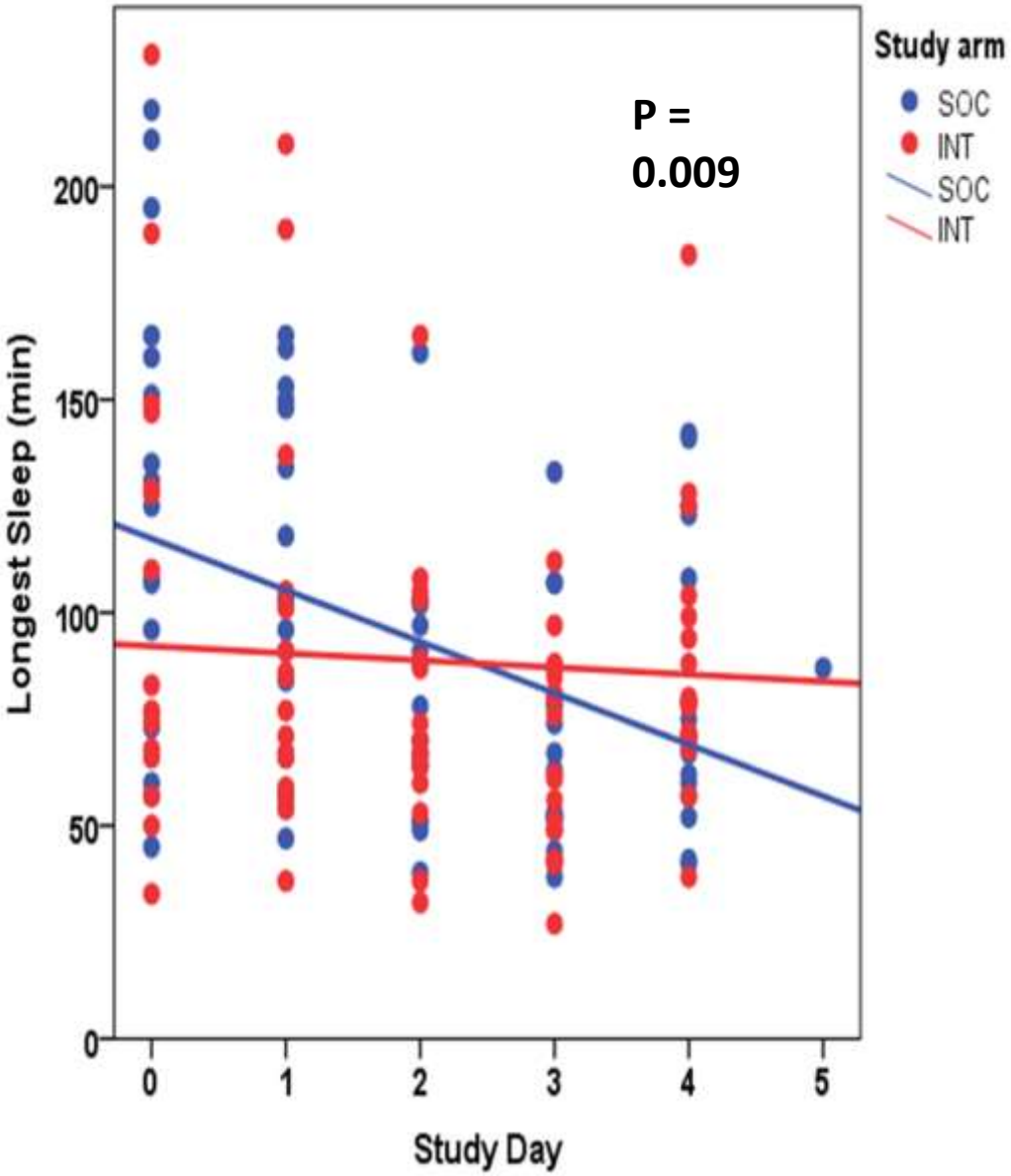
[a]Mean ± SD of 24-hour total sleep time averaged across the study, measured by actigraphy.

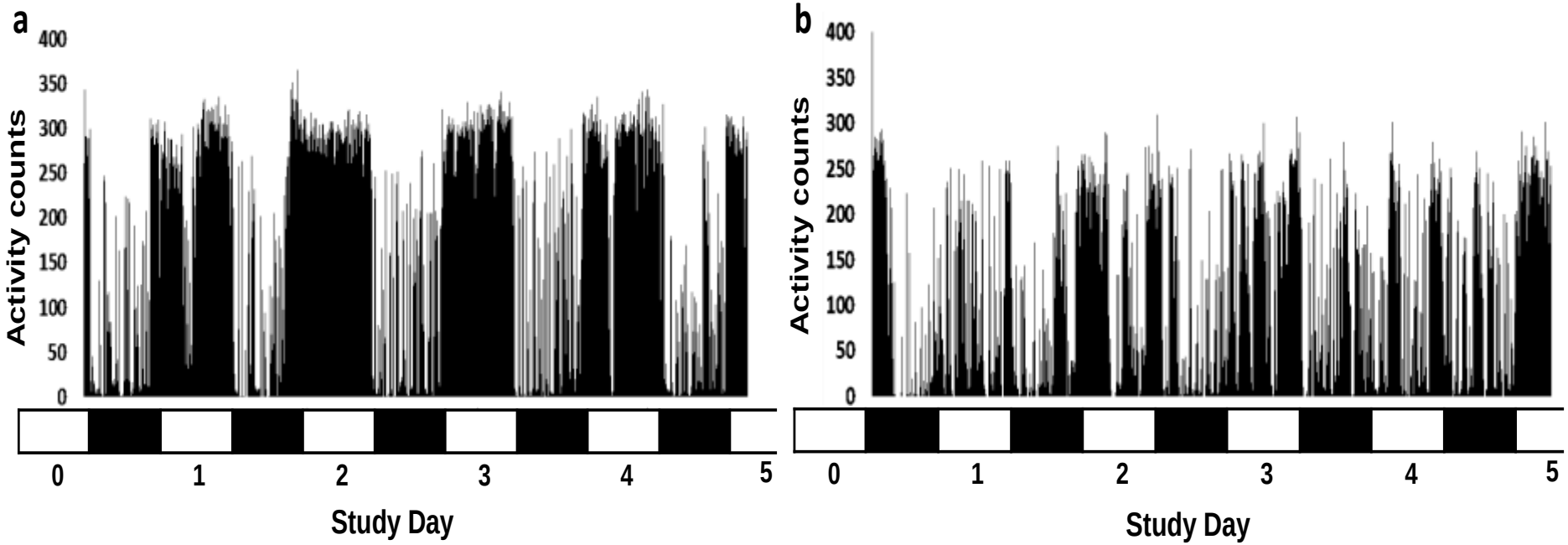
[b]Recommended sleep minus achieved sleep (positive value indicates sleep deficit). Age groups are defined in the National Sleep Foundation recommendations[28]: preschoolers, 3–5 years; school-age children, 6–13 years; teens, 14–17 years; young adults, 18–25 years.

TABLE 3 Actigraphy-derived sleep and wake of children with CNS cancers admitted for high-dose chemotherapy, $N = 33$

	Daytime (9 am to 9 pm)			Nighttime (9 pm to 9 am)		
	INT	SOC	Cohen *d*	INT	SOC	Cohen *d*
Percent sleep (%)	17.3 ± 10.3	18.5 ± 10.7	0.114	56.6 ± 10.5	58.3 ± 12.4	0.157
Mean duration sleep episodes (min)	16.1 ± 5.9	16.9 ± 6.2	0.132	23.1 ± 8.5	26.3 ± 14.5	0.269
Sleep episodes (#)	4.6 ± 2.7	5.5 ± 3.8	0.273	12.3 ± 2.2	12.5 ± 3.0	0.076
Longest sleep episode (min)	41.8 ± 14.8	45.5 ± 16.3	0.238	87.6 ± 32.0	92.9 ± 26.0	0.182
Mean duration wake episodes (min)	167.2 ± 115.1	159.2 ± 126.8	0.066	17.1 ± 5.4	17.9 ± 9.4	0.104
Wake episodes (#)	5.8 ± 2.4	7.2 ± 3.9	0.432	10.7 ± 2.4	10.9 ± 2.6	0.080
Longest wake episode (min)	361.1 ± 124.6	342.1 ± 139.6	0.144	104.8 ± 26.8	112.0 ± 60.0	0.155
Activity score	155.9 ± 45.4	146.1 ± 45.2	0.216	62.9 ± 19.6	59.5 ± 23.0	0.159

Note: INT, intervention group; SOC, standard-of-care group. All numbers presented as mean ± standard deviation of all available actigraphy periods. There were no significant differences between groups for any daytime or nighttime sleep/wake variable by *t* test. Classical Cohen *d* ($d = \frac{|m_1^2 - m_2^2|}{\frac{\sqrt{s_1^2 + s_2^2}}{2}}$, where m_1 or m_2 is the mean of group 1 or group 2, s_1 or s_2 is the standard deviation of group 1 or group 2), was used to calculate effect sizes, all of which were small based on Cohen's[35] proposed interpretation (0.2 = small; 0.5 = medium; 0.8=large).


Study arm
SOC
INT
SOC
INT
P =
0.009
Longest Sleep (min)
0
50
100
150
200
0
1
2
3
4
5
Study Day



Rogers VE, Zhu B, Ancoli-Israel S, Liu L, Hinds PS. Relationship between circadian activity rhythms and fatigue in hospitalized children with CNS cancers receiving high-dose chemotherapy 2020; 28: 1459-1467.

Table 1 Circadian activity rhythm variables of children and adolescents with CNS cancers ($N = 33$) and comparison to reported values

CAR variable	Definition	Reported CAR cut-points or mean ± SD	Sample mean ± SD (range)	N (%) below reported cut-points or mean
Amplitude	Difference between the highest point of the cosine-fitted curve of activity counts (peak activity) and its mean.	• 112.4 ± 4.9 (healthy adults) [40] • 114 ± 24 [15]	69.9 ± 25.4 (20.8–123.4)	31 (93.9) with amplitude <114
24-Hour Autocorrelation (r24)	Reflects the stability of the rest-activity pattern across time. Values range from − 1 (no rhythm) to + 1 (perfect rhythm stability) [41].	Well-defined CAR > 0.28 (adults) [22]	0.28 ± 0.15 (− 0.01–0.62)	19 (57.6) with r24 < 0.28
Dichotomy index, % (I < O)	Compares daytime to nighttime activity, A score of 100% indicates the most robust CAR (activity during sleep consistently lower than activity during wake), 50% indicates no rhythm, and 0% indicates a completely inverted rhythm (activity during sleep consistently higher than activity during wake) [42].	• Well-defined CAR >93.6 [22] • ≥97.5 best predicted survival (cancer patients) [43]	81.7 ± 7.0 (66.0–91.8)	33 (100) with I < O < 93.6

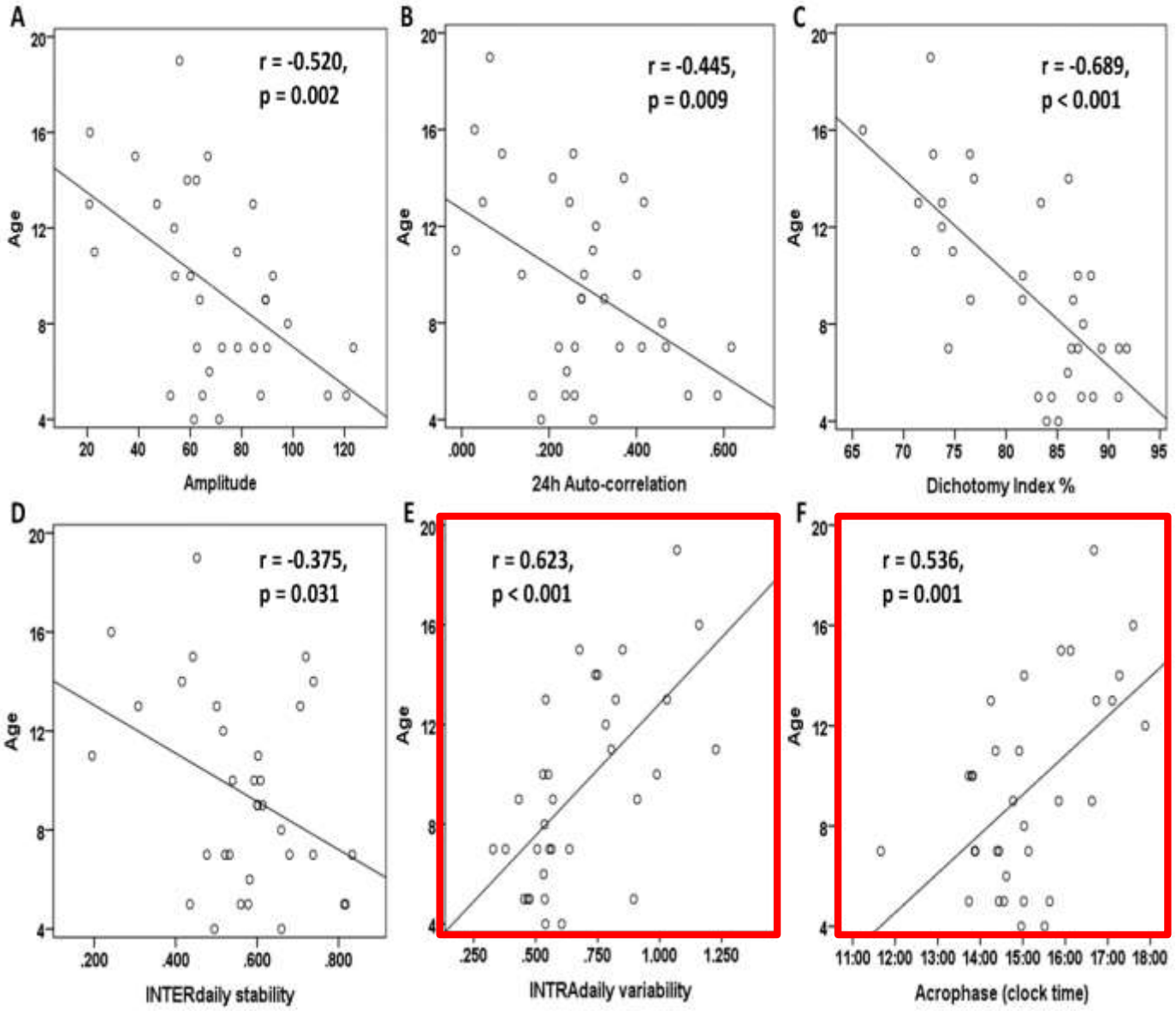

A
r = -0.520,
p = 0.002
Age
Amplitude
B
r = -0.445,
p = 0.009
Age
24h Auto-correlation
C
r = -0.689,
p < 0.001
Age
Dichotomy Index %
D
r = -0.375,
p = 0.031
Age
INTERdaily stability
E
r = 0.623,
p < 0.001
Age
INTRAdaily variability
F
r = 0.536,
p = 0.001
Age
Acrophase (clock time)

Table 3 Partial correlations between circadian activity rhythm variables and fatigue

	Amplitude	24-h Auto-correlation	Intradaily variability	Interdaily stability	Dichotomy index
Parent-reported fatigue ($n = 32$)	−0.576 $p = 0.001$	−0.517 $p = 0.003$	0.587 $p = 0.001$	−0.425 $p = 0.017$	−0.347 $p = 0.056$
Child-reported fatigue ($n = 16$)	−0.474 $p = 0.087$		0.738 $p = 0.003$		−0.465 $p = 0.094$
Adolescent-reported fatigue ($n = 9$)	−0.665 $p = 0.072$			−0.680 $p = 0.063$	−0.664 $p = 0.072$

All correlations controlled for age. Child-reported fatigue only included children aged 7–12 years of age. Correlations with p values < 0.10 are presented

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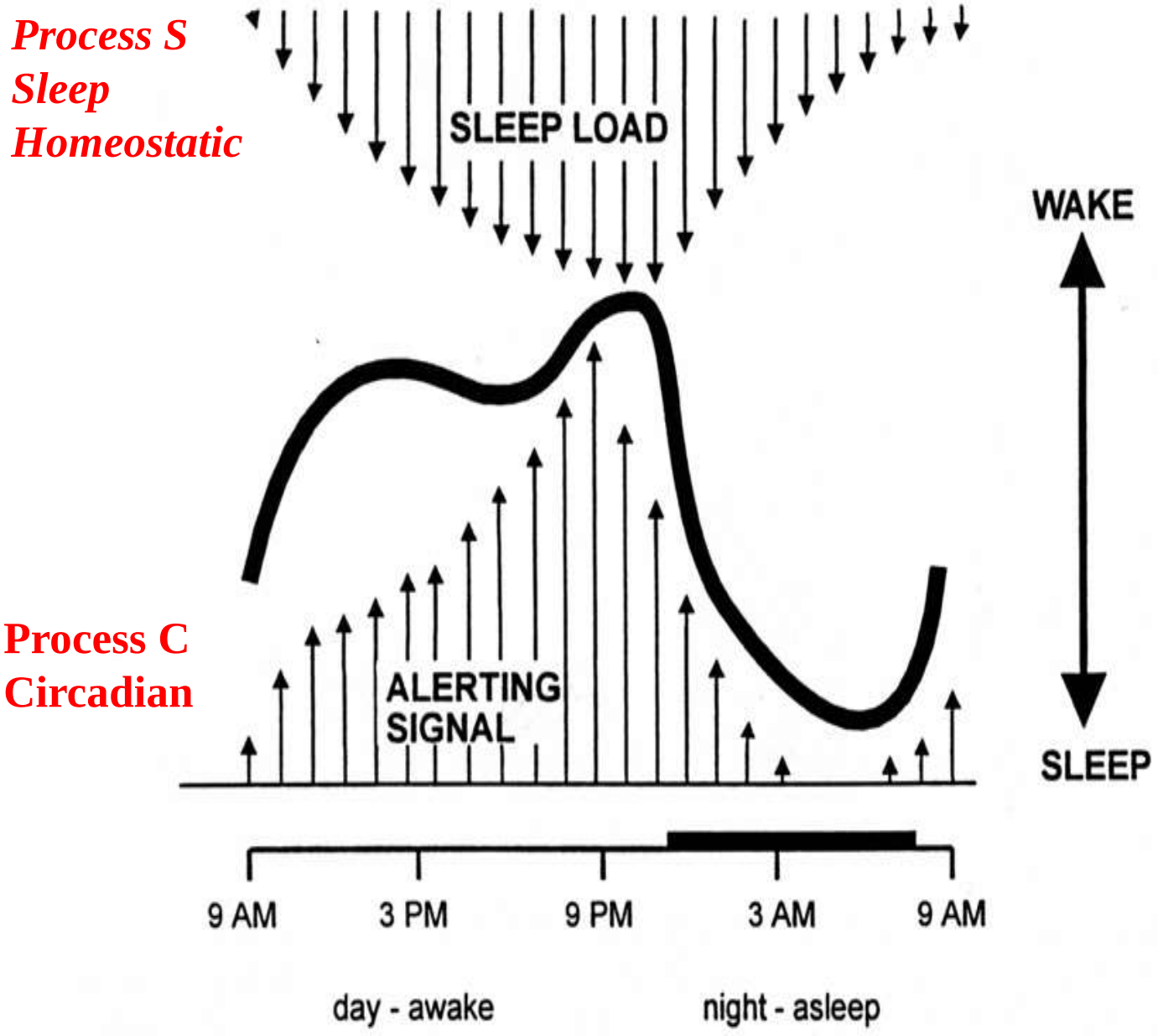
Process S
Sleep
Homeostatic
SLEEP LOAD
WAKE
SLEEP
Process C
Circadian
ALERTING
SIGNAL
9 AM
3 PM
9 PM
3 AM
9 AM
day - awake
night - asleep

Scientific Background
Discoveries of Molecular Mechanisms Controlling the Circadian Rhythm

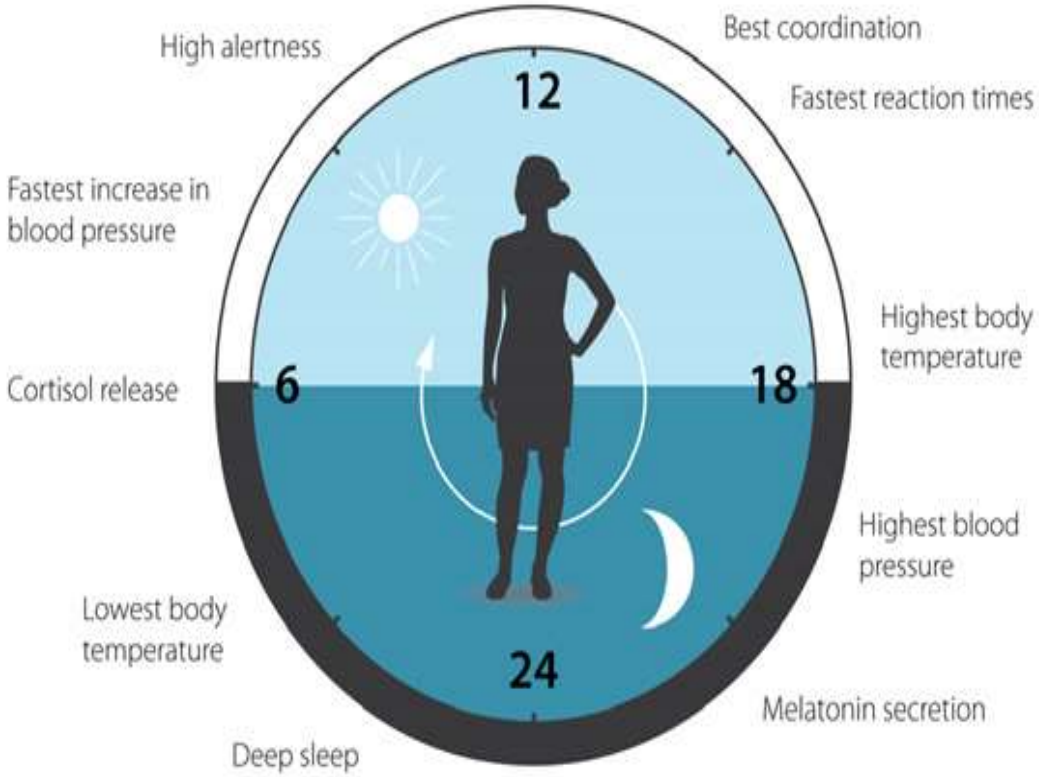

Figure 3. ***The circadian clock has an impact on many aspects of our physiology.***

This clock helps to regulate sleep patterns, feeding behavior, hormone release, blood pressure and body temperature. A large proportion of our genes are regulated by the clock.

Estimate Norms: Sleep Duration

Age Group	Age	Duration (24hr)	Timing	Nap
Infant 1-12 Months	4-6m	16-14	6pm-6am	2-5
	7-12m	16-12		2-3
Toddler 1-2 Years	1-2	14-11	6pm-7am	1-2
Pre-School 3-5 Years	3-4	13-11	6:30p-7:30am	1
	5	12-11		
School-Age 6-12 Years	6-7	12-11	7:30pm-8:00am	0-1
	8-12	11-10	8:00pm-8:30am	
	12	10.5-9.5	8:30pm-8:30am	
Adolescent 13-18 Years	13-14	10-9.5	9:30pm-8:30am	0-1
	15-16	10-9	10:00pm-9:00am	

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Please place your name in the chat box to record your attendance. A list will be generated from the Chat to support the requirements to claim CNE. You can use this link to complete your evaluation and claim your contact hour certificate. Thank you for your participation today!

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