ORIGINAL ARTICLE

Sleep Friendly Ward: A Pilot Project in a Level II Hospital

Ana Rute Manuel, Andreia Fiúza Ribeiro, Sara Completo, Sofia Silva, Helena Cristina Loureiro

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Abstract

Introduction: During illness, good quality sleep can potentiate recovery, since it influences immunity and homeostasis. Hospitalization causes a disturbance in the daily routine, with a negative effect on sleep habits. This project aimed to implement measures to minimize sleep disruption during hospitalization and to evaluate their impact in a pediatric ward.

Methods: Prospective, longitudinal, and interventional study comprising three phases over one year: 1. Evaluation of sleep conditions during hospitalization in the pediatric ward through questionnaires filled out by caregivers/adolescents and health care professionals; 2. Application of measures to improve sleep; 3. Evaluation of the implemented measures.

Results: In phase one (n = 30, mean age of 4.5 years old), the sleep quality in the pediatric ward was inferior when compared to home (subjective sleep quality 0-10: 6.7 *vs* 8.8, nighttime awakenings: 2.1 *vs.* 1.2). Pain, noise, lights, therapeutic administration, alarms, and other patients were the main reasons for nighttime awakenings. Health care professionals (n = 36) agreed that sleep schedules were needed in the ward. In phase two, several measures were applied, namely schedules were defined to turn on/off lights and screens, napping was promoted, there was a reduction of noise/alarms during the night, among others. Flyers with healthy sleep habits were distributed. In phase three (n = 55, mean age 7.9 years old), children/adolescents who knew about the project (n = 21) had fewer nighttime awakenings ($p = 0.03$) and better subjective sleep quality ($p = 0.02$).

Discussion: These results reflect an improvement in sleep quality during hospitalization after implementing the measures created in this project.

Keywords: Adolescent; Child; Child, Hospitalized; Child, Preschool; Infant; Sleep Deprivation/prevention & control; Sleep Hygiene; Sleep Wake Disorders/therapy; Surveys and Questionnaires

Introduction

Adequate sleep has a crucial role in physical, cognitive, and emotional development in childhood.[1,2] The American Academy of Sleep Medicine establishes the recommended hours of sleep for the pediatric age that are associated with improved attention, behavior, learning, memory, emotional regulation, quality of life, and mental and physical health.[3]

Good sleep quality, with an age appropriate duration, has a recuperating role during illness, thereby potentiating recovery.[4] Actually, sleep is essential for the immune system, since cytokines and interleukins, which are necessary for hormonal regulation, are produced during this period. In addition, pain sensitivity is increased in cases of inappropriate sleep.[5]

Hospitalization contributes to disruptive sleep due to factors such as illness, pain, stress, and anxiety. Moreover, daily routine disturbance and the hospital environment have a negative impact on sleep, thereby impairing recovery.[4,6-8]

There are a few studies concerning sleep conditions during hospitalization in the pediatric age, mostly in the setting of intensive care units or specific populations, which show a reduction of sleep periods as well as an increasing number of awakenings and increasing amount of daytime somnolence among inpatients.[4,7-9] In this scope, there are two Portuguese studies on the pediatric wards of a tertiary hospital, one describing the sleep routine during hospitalization and the other evaluating the impact of the environmental variables (light, sound, temperature) in sleep quality during hospitalization and sleep quality at home and in the hospital.[6,8] For all the reasons mentioned, good sleep periods must be created in hospitals.

Promoting sleep habits resembling the usual routine, limiting clinical care during nighttime and enhancing patient comfort by pain relief are essential measures to improve sleep during hospitalization.[5,8] In addition, it is

Pediatrics Service, Child and Youth Department, Hospital Professor Doutor Fernando Fonseca, Amadora, Portugal
Corresponding Author
Ana Rute Manuel
https://orcid.org/0000-0002-0167-7430
ana.rute.manuel@gmail.com
IC 19, 2720-276 Amadora, Portugal
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important to ensure adequate room conditions, such as a comfortable temperature, and to reduce the noise and illumination during resting periods.[5-8]

The main goals of this project were to implement measures to minimize sleep disruption during hospitalization and evaluate their impact on sleep quality in a pediatric ward of a level II hospital in the metropolitan area of Lisbon. The secondary goals were to assess the sleep conditions at home and in the pediatric ward and promote healthy sleep habits among inpatients, such as bedtime stories read by a caregiver and the appropriate use of screens.

Methods

This was a prospective, longitudinal, and interventional study developed in a pediatric ward of a public level II hospital in Amadora that serves 155,628 pediatric patients, according to the Portuguese census of 2011, with a hospitalization rate of around 1% in 2019. The ward has medical and surgical patients and has 33 beds, 6 in the intermediate care unit, 10 individual and 5 shared rooms, with 2 or 3 beds each.

The participants were randomly selected when hospitalization in the pediatric ward lasted at least 24 hours. Children with a cognitive disorder that impaired the sleep-wake cycle or whose caregivers did not consent to the study were excluded.

This study comprised three different phases over a period of one year (Fig. 1). In phase one, sleep conditions during hospitalization in the pediatric ward were evaluated. Two sets of questionnaires, including closed and open questions, were designed based on modified variables identified through a literature review and clinical experience.[6,8] The first questionnaire was filled out by caregivers (when the inpatient age was under 12 years old) and adolescents (when the inpatient age was above or equal to 12 years old). It assessed the family setting, sleep habits at home and during hospitalization, and global subjective sleep quality, which was evaluated by way of two variables: the average nighttime awakenings and the subjective sleep quality set by each participant on a quantitative scale from 0 (very bad) to 10 (very good). The second questionnaire was filled out by the health care staff (doctors, nurses, and patient care technicians) and assessed the pediatric ward organization, sleep schedules, and nap/nighttime sleep conditions.

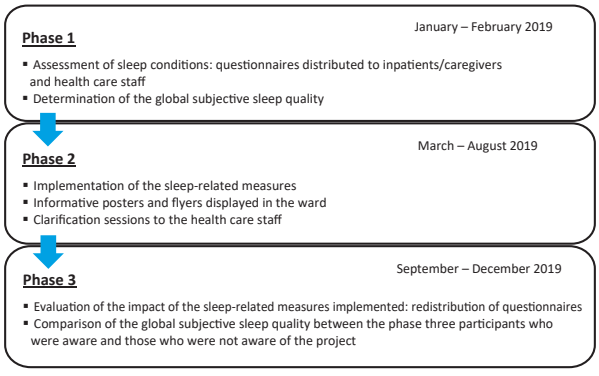

Figure 1. Chronogram of the project sleep friendly ward.

Based on the analysis of the answers of both questionnaires, measures were created for application in the pediatric ward to improve the quality of sleep during hospitalization.

In phase two, these sleep measures were implemented in the pediatric ward. Informative posters were displayed in the ward and flyers were distributed to caregivers/adolescents at ward admission, holding information about sleep measures to adopt during hospitalization and disclosing take-home messages related to healthy sleep habits. Furthermore, clarification sessions were held for the health care staff.

Lastly, phase three evaluated the impact of the sleep measures six months after being implemented. The same first questionnaires were distributed to the same health care staff and to caregivers or adolescents hospitalized at the time in order to compare with the initial data collected. An additional question was added to verify if the participants were informed about the project and their answers were used to compare the two groups (the ones that knew about the project and those who did not) in order to clarify its impact on sleep quality.

Statistical analysis was performed with SPSS® v.23.0 (SPSS Inc, Chicago, IL, USA), using parametric and nonparametric tests (independent t test, chi-square test) and the level of significance was $p < 0.05$.

The project was approved by the ethical committee of our institution. Informed consent was provided by all of the participants. All of the information was anonymous and confidential.

Results

Phase one

Questionnaires answered by caregivers and adolescents

A total of 30 questionnaires were filled out by caregivers (n = 23) and adolescents (n = 7). The average participant age was 4.5 years old (minimum 1 month old, maximum 16 years old). There was a preponderance of participants with parents with low education levels and non-qualified jobs (that do not require a higher degree). The demographic characteristics of the phase one sample are shown in Table 1.

Based on the data obtained from the questionnaires concerning the sleep-conditions and habits at home, it was found that most of the participants slept in a shared room (66.7%) in their own bed (60%) and they had company when falling asleep (63.3%). Regarding the use of electronic devices, most of the participants had at least one screen in the bedroom (70%), 66.7% used screens after dinner and screens were part of the bedtime routine in 36.7%. Moreover, 40% of the participants spent at least one hour per day using electronic devices and 10% spent four hours or more. Table 2 details the characteristics of sleep and sleep-related conditions at home from the phase one sample. Sixty percent of the participants were hospitalized for the first time. In what concerns sleep-conditions in the ward, 20% had an individual room, 36.7% had a shared room in the ward, and 43.3% were in the intermediate care unit. Almost all of the participants were accompanied by a caregiver overnight. The vast majority needed therapeutic administration during the night (76.7%). Nearly half of the participants kept the usual bedtime routine during hospitalization, which included music in 44.4%, screens in 33.3%, and books/stories in 5.6%. Table 3 contains the characteristics of sleep and sleep-related conditions during hospitalization from the phase one sample.

Comparing the global subjective sleep quality at home and in the pediatric ward, it was noticeable that sleep quality was considerably worse in the hospital, as shown by a higher number of nighttime awakenings on average (2.1 ± 1.6 in the hospital *vs.* 1.2 ± 1.1 at home) and an inferior subjective sleep quality on average (6.7 ± 2.5 in the hospital *vs.* 8.8 ± 1.5 at home). Considering the reasons for nighttime awakenings in

Table 1. Demographic data from the phase one and phase three samples

Demographic characteristics	Phase one (n = 30)	Phase three (n = 55)
Participants age group		
Neonates/Infants (< 1 year)	40.0%	10.9%
Toddlers/preschoolers (1-5 years)	30.0%	29.1%
School aged children (6-11 years)	10.0%	29.1%
Adolescents (12-18 years)	20.0%	29.1%
Mother		
School level		
Primary school	3.3%	9.1%
Basic education	26.7%	34.5%
High school	46.7%	29.1%
Bachelor's degree	13.3%	16.4%
Master's degree	0.0%	3.6%
Job		
Qualified	16.7%	16.4%
Non-qualified	66.7%	63.6%
Unemployed	10.0%	12.7%
Shift work	13.3%	7.3%
Father		
School level		
Primary school	3.3%	9.1%
Basic education	26.7%	25.5%
High school	36.7%	29.1%
Bachelor's degree	16.7%	10.9%
Master's degree	0.0%	1.8%
Job		
Qualified	13.3%	10.9%
Non-qualified	66.7%	61.8%
Unemployed	6.7%	1.8%
Shift work	23.3%	18.2%

the hospital, these were 30% pain, 26.7% therapeutic administration, 20% alarms, 23.3% disease itself, and 16.7% other patients. Other reasons for nighttime awakenings were heat, too much noise, lights, agitation around, different environment from home, and different sleeping schedules.

Questionnaires answered by the health care staff

A total of 38 questionnaires were filled out by nurses (50%), doctors (36.1%), and patient care technicians (13.9%). The answers are summarized in Table 4.

The conditions of the pediatric ward were, for the most part, consensual among professionals: children and adolescents are distributed according to the medical condition (97.2%) and age (83.3%), rooms in the ward do not have a good sound or light insulation from the exterior (72.2%), rooms have a television (100%), and no available toys (77.8%), children and adolescents can have one caregiver during the night (94.4%).

Regarding the ward schedules, 52.8% answered that children and adolescents do not have a time limit to play nor to turn off the electronic devices (72.2%). Moreover, 69.4% answered that children and adolescents do not have a time limit to fall asleep or wake up (91.7%).

About sleep-conditions during hospitalization, most health professionals answered that lights are usually reduced during the night (91.7%) as well as noise (75%), although with no defined schedule. According to 80.6%,

Table 2. Characterization of the sleep and sleep-related conditions at home from the phase one and phase three samples

Sleep conditions at home	Phase one (n = 30)	Phase three (n = 55)
Average hours of sleep (including naps)		Week - Weekend
Neonates/infants (< 1 year)	-	15.0 ± 1.8 - 15.3 ± 1.3
Toddlers/preschoolers (1-5 years)	-	11.5 ± 1.5 - 12.1 ± 1.3
School aged children (6-11 years)	-	10.2 ± 1.0 - 10.8 ± 1.3
Adolescents (12-18 years)	-	9.0 ± 1.2 - 10.5 ± 1.6
Type of room		
Individual	26.7%	32.7%
Shared	66.7%	65.5%
Bedtime routine		
Book/story	6.7%	16.4%
Music	30.0%	20.0%
Screen	36.7%	45.5%
Company when falling asleep	63.3%	49.1%
Local where falls asleep		
Own bed	60.0%	81.8%
Couch	10.0%	5.5%
Parent bed	13.3%	1.8%
Other	10.0%	5.5%
Screens inside the bedroom		
None	30.0%	30.9%
Television	50.0%	45.5%
Tablet	3.3%	9.1%
Computer	10.0%	14.5%
Mobile phone	26.7%	34.5%
Hours per day using screens		
One hour	40.0%	20.0%
Two hours	20.0%	27.3%
Three hours	10.0%	21.8%
Four or more hours	10.0%	20.0%
Uses screens after dinner	66.7%	67.3%
Average nighttime awakenings at home	1.2 ± 1.1	0.9 ± 1.0
Average subjective sleep quality at home (scale 0-10)	8.8 ± 1.5	8.9 ± 1.3

room doors and blinds are closed during the night, and 69.4% answered that there is a restriction of circulation in this period. Most participants agreed that health professionals try to compress all medical care in a few periods during the night (86.1%). When inquiring about the attitude assumed by health care staff when there is a need to enter a room where a patient is sleeping, 63.7% answered that a flashlight is used, 27.8% stated that the bedside light is switched on, and 8.3% did not know.

Concerning the nap conditions in the pediatric ward, 52.8% answered that it is not common for children up to 6 years old to nap during hospitalization, 41.7% stated that the lights are usually not reduced, 61.1% stated that there is no reduction in noise, 50% stated that the room doors are not closed, and 44.4% stated that the blinds are also not closed.

Finally, there was a consensus between all of the health professionals regarding the need to establish formal schedules in the pediatric ward. Other suggestions given were to compress and optimize medical care during the night, to set proper schedules for therapeutic administration during nighttime, to minimize alarms during the night as well as technical errors that make alarms ring unnecessarily, and to set a time limit for non-urgent transfers to the inpatient unit.

Phase two

After a thorough analysis of the data obtained from phase one, 20 measures were created for application in our pediatric ward:

- In shared rooms, children should be allocated according to their age;
- Lights are turned on at 7 am and turned off at 10 pm;
- Napping is encouraged for children aged 5 years or under;
- At night and during nap time, the doors and blinds should be closed;
- Visits are allowed between 4 pm and 8 pm;
- Screens must be turned off one hour before bedtime;
- Reading a bedtime story is recommended;
- Noise must be avoided after 10 pm;
- Alarms should be minimized;
- The room temperature should be kept within a comfortable range;
- From 10 pm on, only one caregiver is allowed, and change between caregivers after that time is not authorized;
- Non-urgent patients should be transferred to the inpatient unit until 11 pm, with minimal disturbance;
- Movement throughout the ward should be limited during the nighttime;

Table 3. Characterization of the sleep and sleep-related conditions during hospitalization from the phase one and phase three samples

Sleep conditions during hospitalization	Phase one (n=30)	Phase three (n=55)
First hospitalization	60.0%	45.5%
Type of room		
Individual	20.0%	36.4%
Shared in the infirmary	36.7%	40.0%
Shared in the intermediate care unit	43.3%	21.8%
Overnight company	90.0%	83.6%
Needs therapeutic administration during the night	76.7%	76.4%
Keeps bedtime routine	46.7%	**60.0%**
Book/story	5.6%	21.2%
Music	44.4%	18.2%
Screen	33.3%	63.6%
Awakes in the night	76.7%	81.8%
Average nighttime awakenings during hospitalization	2.1 ± 1.6	1.9 ± 1.3
Reason for nighttime awakenings		
Pain	30.0%	25.5%
Therapeutic administration	26.7%	27.3%
Alarms	20.0%	18.2%
Disease	23.3%	16.4%
Other patients	16.7%	20.0%
Average subjective sleep quality in hospital (scale 0-10)	6.7 ± 2.5	6.7 ± 2.3
Awareness of the project sleep friendly ward	-	38.2%
Intends to maintain sleep-related measures learned	-	61.9%

- Material should not be replaced during the night;
- During the night, excluding emergency cases, medical and nursing care (like therapeutic administration and checking vital signs) should be performed with a flashlight to minimize disturbance;
- At night, medical and nursing care should be combined in specific moments and medication must be administered in a fixed schedule;
- Conditions for the rest of the caregivers should be provided;
- The educational assistants should develop activities to promote healthy sleep habits (drawing contests having sleep as the main theme, choosing a bedtime story, among others);
- Posters with the aforementioned sleep-promoting measures must be displayed in the ward for health care staff, inpatients and caregivers;
- Flyers with sleep-promoting measures and good sleep habits must be given to the caregivers and adolescents upon admission to the ward. These flyers contained the recommended sleep duration according to age and advised to maintain sleep schedules during the weekend, not to use electronic devices one hour before sleep, to avoid screens inside the bedroom, find alternatives for bedtime routine, such as book reading, and daily physical exercise.

Phase three

Questionnaires answered by caregivers and adolescents

A total of 55 questionnaires were answered by caregivers

Table 4. View of the health care professionals concerning the sleep conditions in the pediatric ward*

Sleep conditions during hospitalization	Phase one (n = 38)	Phase three (n = 19)
Pediatric ward organization		
Inpatients are allocated according to medical condition	97.2%	89.5%
Inpatients are allocated according to age	83.3%	78.9%
The rooms have adequate sound and light insulation from the exterior	19.4%	26.3%
The rooms have toys	16.7%	26.3%
The rooms have television	100.0%	94.7%
Number of caregivers allowed to stay during the night		
One	94.4%	100.0%
Schedules in the pediatric ward		
Inpatients have a time limit to play	36.1%	**57.9%**
Inpatients have a time limit to turn off electronic devices	13.9%	**73.7%**
Inpatients have a time limit to fall asleep	22.2%	**68.4%**
In-patients have a time limit to wake up	2.8%	21.1%
Sleep-related conditions in the pediatric ward during the night		
Lights are usually reduced	91.7%	**100.0%**
Noise is usually reduced	75.0%	**100.0%**
Room doors are closed	80.6%	89.5%
Room blinds are close	80.6%	**100.0%**
Circulation is restricted	69.4%	**94.7%**
When the health care staff enters the room where the patient sleeps, usually uses		
Room light	0.0%	0.0%
Bedside light	27.8%	5.3%
Flashlight	63.9%	**94.7%**
Care is circumscribed in defined periods	86.1%	89.5%
Sleep-related conditions in the pediatric ward during naptime		
Inpatients up to 6 years-old take a nap	33.3%	**52.6%**
Lights are usually reduced	36.1%	**57.9%**
Noise is usually reduced	22.2%	26.3%
Room doors are closed	30.6%	**63.2%**
Room blinds are close	27.8%	**57.9%**

* Only positive answers are shown.

(n = 39) and adolescents (n = 16). The average participant age was 7.9 years old (minimum 1 month old, maximum 18 years old). The remaining demographic features of the phase three sample are similar to the ones from phase one (Table 1).

The number of sleep hours met the recommendations for all age groups. The overall characteristics of sleep at home were much like the phase one sample (Table 2). On average, there were fewer nighttime awakenings at home compared to the phase one sample, but the subjective sleep quality at home was similar.

There were fewer first hospitalizations (45.5%) and fewer participants in the intermediate care unit (21.8%). In 60% of cases, the bedtime routine was maintained during hospitalization, which included screens in most cases (63.6%), a book/story in 21.2%, and music in 18.2%.

Most participants reported waking up during the night (81.8%), due to pain (25.5%), therapeutic administration (27.3%), alarms (18.2%), the medical condition itself (16.4%), and other patients (20%). Other reasons for the nighttime awakenings were noise, the different environment, and the different sleeping schedules. Although the average nighttime awakenings during hospitalization was slightly lower than the phase one sample, the average subjective sleep quality was similar. Lastly, although only 38.2% (n = 21) of the participants revealed knowledge about the project and the measures implemented to reduce sleep disturbance in the pediatric ward, 61.9% (n = 13) of these intended to maintain the measures learned, namely, to set a proper bedtime, exclude electronic devices, and read a book as the bedtime routine.

The characteristics of sleep and sleep-related conditions during hospitalization from the phase three sample are shown in Table 3.

Questionnaires answered by the health care staff

A total of 19 questionnaires were filled out by nurses (47.4%), doctors (42.1%), and patient care technicians (10.5%). The answers are summarized in Table 4.

The questions concerning the conditions of the pediatric ward had answers that reach consensus, similar to phase one.

Regarding the schedules of the pediatric ward, 57.9% answered that there is a time limit to play, 73.7% answered that there is a time limit to turn off the electronic devices, and 68.4% answered that there is a time limit to bedtime, although the precise timetable did not reach consensus. Most professionals answered that there is no time limit for waking up (68.4%).

Regarding the night period, 100% of the participants answered that lights and noise are reduced, 89.5% that room doors are closed, and 100% that the room blinds are also closed. According to 94.7%, there is a restriction of circulation in the night period. In addition, 89.5% answered that professionals compress all medical care in a few moments and 94.7% agreed that a flashlight is used when there is the need to enter the patient room during the night.

About sleep conditions during nap time in the ward, 52.6% stated that those who are up to 6 years old nap during hospitalization, 57.9% stated that the lights are usually reduced, 52.6% stated that there is no reduction in noise, 63.2% stated that the room doors are closed, and 57.9% stated that the blinds are also closed.

Statistical analysis

The statistical analysis performed in the phase three sample compared the global subjective sleep quality during hospitalization in participants who knew about the project of sleep friendly ward and those not aware of it (Table 5). A significant difference was found in the mean between the two. The group that knew about the project had, on average, fewer nighttime awakenings ($p = 0.03$) and superior subjective sleep quality ($p = 0.02$).

The global subjective sleep quality during hospitalization was not affected by age, maternal literacy, global subjective sleep quality at home, hospital room type (which can be an indirect measure of disease severity), or first hospitalization ($p < 0.05$).

Discussion

Sleep quality during hospitalization is influenced by non-modifiable factors, such as the baseline sleep pattern and acute illness, and by a series of other variants related to the sleep-conditions in the wards, which can be modified to create a more sleep-friendly environment.[4]

This study showed an inferior subjective sleep quality in the pediatric ward compared to home, which is in agreement with other published studies from tertiary hospitals, although sleep quality was assessed using different subjective and objective methods (non-validated questionnaires, Child Sleep Habits Questionnaire, and actigraphy).[5-7,9] These results highlight the need for each department to establish sleep-related measures to be implemented in order to improve sleep and overall recovery from disease.

In phase one, the sleep conditions were surveyed among the inpatients and health care professionals. Although there was already an effort to organize children and

Table 5. Comparison of sleep conditions between the participants who were aware of the project and those participants who were not aware of the project (both from the phase three sample)

Sleep conditions	Awareness of the project sleep friendly ward*		p
	Yes (n = 21)	No (n = 32)	
Average age	8.0 (minimum 2 months, maximum18 years)	7.3 (minimum 1 month, maximum 17 years)	
Maternal literacy			0.67
Primary school	4.8%	12.5%	
Basic education	38.1%	31.3%	
High school	28.6	28.1%	
Bachelor's degree	14.3	18.8%	
Master's degree	0.0%	6.3%	
Average nighttime awakenings at home	0.9 ± 0.9	1.0 ± 1.0	0.69
Average subjective sleep quality at home (scale 0-10)	9.1 ± 0.8	8.8 ± 1.6	0.44
First hospitalization	38.1%	50.0%	0.34
Type of room			0.71
Individual	42.9%	31.3%	
Shared in the infirmary	38.1%	40.6%	
Shared in the intermediate care unit	19.0%	25.0%	
Keeps bedtime routine	71.4%	50.0%	0.07
Awakes in the night	76.2%	87.5%	0.16
Reasons for nighttime awakenings			
Pain	23.8%	25.0%	0.87
Therapeutic administration	33.3%	21.9%	0.43
Alarms	9.5%	21.9%	0.22
Disease	14.3%	18.8%	0.64
Other patients	19.0%	21.9%	0.76
Average nighttime awakenings during hospitalization	1.5 ± 1.1	2.3 ± 1.4	0.03
Average subjective sleep quality in hospital (scale 0-10)	7.6 ± 2.2	6.1 ± 2.0	0.02

* Two participants did not answer.

adolescents in the ward according to age and medical condition as well as to allow the presence of one caregiver during the night, there was yet a lot to improve, starting by the definition of sleep-related schedules and measures to reduce sleep disturbance during the night and naptime. Before this project, there were no specific timetables for turning off electronic devices, starting the bedtime routine, or falling asleep. Furthermore, the reduction of noise, lights, and movement in the ward during resting periods was not mandatory, nor was the effort to circumscribe medical care and therapeutic administration in defined periods during the night for all patients. Professionals and inpatients agreed that the minimization of alarms and circulation during the night was essential to improving sleep quality in the ward. In another Portuguese study, with similar results related to sleep conditions, the authors also concluded that exogenous variables and ward routines are important to reduce sleep disruption.[8]

The assessment of sleep conditions at home was important for selecting information to point out in flyers, which aimed to present the sleep measures in the ward and to correct the main mistakes observed among in-home sleep habits. For example, in the phase one sample, a large percentage of participants used electronic devices after dinner, had screens inside the bedroom, and included screens in their bedtime routine. As a result, the flyers contained strong recommendations against the use of electronic devices one hour before sleep, since screen usage is associated with reduced sleep duration, delayed sleep onset, and overall poorer sleep quality, not only in adolescents but also in younger children.[10,11] The distribution of these flyers originated a great opportunity to educate caregivers on sleep hygiene, which is crucial since it was shown that, in general, parents lack knowledge concerning the sleep requirements and signs of sleep difficulties in

children.[12,13] A systematic review stated that children with parents more conscious about their children's sleep were more likely to endorse healthier sleep practices.[13] Other studies found that the literacy level and household income of the parents were positively correlated with the awareness of the sleep quality in their children.[12] However, in our study, there was no correlation between maternal literacy and knowledge of the project nor with subjective sleep quality.

The measures created to improve sleep conditions during hospitalization aimed to produce a more sleep-friendly environment and to solve some of the problems posed by patients and health care staff. To restrict movement and create routine sleep schedules, a timetable to turn on and off the lights was created, suggesting the moment for falling asleep and waking up. Sleep-related measures were applied in a transversal manner to standardize patient care, although subsequent adjustments could be made to consider the age groups.

The impact of the sleep-measures implemented was assessed by the answers from phase three questionnaires from the health care staff and caregivers/adolescents. The measures were known by most professionals answering phase three questionnaires, as shown by a significant change in their answers, particularly in those related to naptime, thereby indicating a successful disclosure of the project among health care staff. Moreover, a higher percentage of participants in phase three kept the bedtime routine during hospitalization, as was encouraged. Having a consistent bedtime routine is essential to improving sleep quality and promoting positive child development and family functioning. Maintaining this routine in the hospital is important to reduce sleep problems and improve recovery.[14] Furthermore, positive bedtime routines, such as music therapy and storytelling, have been proven to significantly improve sleep quality in hospitalized children.[15] As in a great number of cases the bedtime routine of the participants included screens, special efforts were made by the educational assistants to promote book reading instead, with daily distribution of age adequate books, chosen with the help of the child or adolescent.

A positive impact was also deduced from the results, which showed that the participants who were aware of the project had a better global subjective sleep quality and intended to maintain the measures learned at home. These results encourage the continuation of the project and its extension to all patients in the pediatric ward. Nevertheless, phase three answers showed that not all participants had knowledge of the project yet and certain measures were still not fully respected (for instance, noise was still a reason given for nighttime awakenings and recommendations related to naptime were not instituted in all cases). It can be argued that the participants who claimed to know the project were more aware of in-hospital sleep-conditions, thereby having a greater perception of their sleep quality and adhering better to the measures.

This study has some limitations. Firstly, since it was a pilot project, it was performed in a small sample, which may have affected the statistical analysis. Still, the positive results obtained encourage the implementation on a larger scale.

Secondly, the sample from phase one was formed by a great percentage of children under 5 years old, unlike the phase three sample, composed of older children, which may have influenced some of the sleep-conditions at home. However, the average nighttime awakenings and average subjective sleep quality at home were similar between the two samples for all age groups. Still regarding phase one, it was not possible to evaluate if the recommended sleep hours at home were met, since naptime was not considered in the first questionnaires.

Lastly, not all participants were aware of the project after the implementation phase. This fact could be explained by the lack of flyers delivery to all patients, absence of parental education at the moment of flyer handling, or education not provided at the right time. Another explanation could be that, while positive, the measures created were difficult to apply in the ward and may need some adjustment. For instance, the best moment during hospitalization for flyer distribution and caregiver/adolescent education on sleep routines in the ward remains to be defined. In addition, regular formative sessions to health care staff should be provided and extended to other pediatric department areas, such as professionals from the emergency service.

In conclusion, the definition of measures related to sleep in pediatric wards is essential and can improve the quality of sleep of children and adolescents during hospitalization, acting almost as a therapeutic means for recovery. Hospitalization can be an opportunity to correct and promote healthy sleep habits to be subsequently maintained at home.

WHAT THIS STUDY ADDS

- A sleep-friendly ward with defined schedules improves sleep quality during hospitalization.
- It is useful to define a specific moment during hospitalization for the patient education of healthy sleep habits.
- Maintaining a bedtime routine during hospitalization improves sleep quality.
- Electronic devices are a part of the bedtime routine in most children and adolescents during hospitalization. Alternatives, such as reading a book, should be encouraged.
- Frequent formative sessions to health care staff concerning in-hospital sleep conditions should be provided.

Conflicts of Interest

The authors declare that there were no conflicts of interest in conducting this work.

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Protection of human and animal subjects

The authors declare that the procedures followed were in accordance with the regulations of the relevant clinical research ethics committee and with those of the Code of Ethics of the World Medical Association (Declaration of Helsinki).

Provenance and peer review

Not commissioned; externally peer reviewed

Confidentiality of data

The authors declare that they have followed the protocols of their work centre on the publication of patient data.

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Awards and presentations

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Enfermaria Amiga do Sono: Um Projeto Piloto num Hospital de Nível II

Resumo:

Introdução: Na doença, um sono de qualidade é fundamental à recuperação, pela influência na imunidade e homeostasia. A hospitalização é uma disrupção da rotina, com efeito negativo nos hábitos de sono. Este projeto teve por objetivo adotar medidas para minimizar a disrupção do sono e avaliar o seu impacto durante a hospitalização.

Métodos: Estudo prospetivo, longitudinal, de intervenção com três fases, ao longo de um ano: 1. Avaliação das condições do sono no internamento de pediatria através da distribuição de inquéritos aos cuidadores / adolescentes e profissionais de saúde; 2. Aplicação de medidas para promoção do sono; 3. Avaliação do impacto.

Resultados: Na primeira fase (n = 30, idade média 4,5 anos), verificou-se pior qualidade do sono no internamento relativamente ao domicílio (qualidade subjetiva do sono 0-10: 6,7 *vs* 8,8, despertares noturnos: 2,1 *vs* 1,2), sendo as causas apontadas dor, ruído, luminosidade, administração de medicação, alarmes e outros doentes. Houve consenso nas respostas dos profissionais (n = 36) acerca da necessidade de implementação de horários de sono na enfermaria. Na segunda fase foram aplicadas medidas como horários para apagar / acender luzes e ecrãs, promoção da sesta, redução do ruído / alarmes durante a noite, entre outras. Foram distribuídos folhetos informativos sobre higiene do sono. Na terceira fase (n = 55, idade média 7,9 anos), verificou-se que crianças / adolescentes com conhecimento do projeto (n = 21) apresentavam menos despertares noturnos (p = 0,03) e melhor qualidade subjetiva do sono (p = 0,02).

Discussão: Estes resultados traduzem uma melhoria na qualidade do sono em internamento após a aplicação das medidas criadas neste projeto.

Palavras-Chave: Adolescente; Alterações do Sono-Vigília/tratamento; Criança; Criança Hospitalizada; Higiene do Sono; Inquéritos e Questionários; Lactente; Pré-Escolar; Privação do Sono/prevenção & controle