RESEARCH ARTICLE

Screen Media Use in Hospitalized Children

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ABSTRACT

BACKGROUND AND OBJECTIVES: Screen media overuse is associated with negative physical and mental health effects in children. The American Academy of Pediatrics recommends limiting screen media use at home; however, there are no similar guidelines for children's hospitals. This study was conducted to explore caregiver (parent or other guardian) perceptions about screen media use, compare at-home with in-hospital screen media use, and measure screen use among hospitalized children.

METHODS: We obtained data from a convenience cohort of hospitalized children at a single, comprehensive tertiary care children's hospital over 3 periods of 2 weeks each from 2013 to 2014. Home and hospital screen media use was measured through survey and study personnel directly observed hospital screen use. Descriptive statistics are reported and generalized estimating equation was used to identify characteristics associated with screen media use.

RESULTS: Observation (n = 1490 observations) revealed screen media on 80.3% of the time the hospitalized child was in the room and awake, and 47.8% of observations with direct attention to a screen. Surveyed caregivers reported their child engaging in significantly more screen media use in the hospital setting as compared with home, and 42% of caregivers reported the amount of screen time used by their child in the hospital was more than they would have liked.

CONCLUSIONS: Hospitalized children have access to a variety of screen media, and this media is used at rates far higher than recommended by the American Academy of Pediatrics. Children's hospitals should consider developing guidelines for screen media use.

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Media is a strong influence in children's lives. It is estimated that children spend an average of 7 hours a day on entertainment media, including televisions, computers, and handheld and other electronic devices.[1] Entertainment media displaces time spent on homework, sleeping, and playing, and also influences beliefs and behaviors.[2] There have been numerous studies showing the detrimental effects of screen media use with associations including aggressive behaviors,[3] obesity,[4] disordered sleep,[5,6] attention-deficit disorder,[7] impaired cognitive development,[8] lower academic performance,[9] mood disorders,[10] and psychological distress.[10–12] Excessive use of screen media also has short-term effects including restless sleep,[2,13] depressed mood,[14] disordered eating,[15,16] and exacerbation of health-related fears.[17–19] Sleep, specifically, is generally assumed to be conducive to healing, with effects on immune system functioning[20–22] and regulating mood,[23–25] and viewing media in the evening and/or in the bedroom has been associated with increased sleep problems and decreased sleep duration.[26–30]

The American Academy of Pediatrics (AAP) has recognized the negative physical and mental health effects possible from increased screen use. The AAP encourages pediatricians to share with caregivers the potential harmful effects of media, and advises limiting total noneducational screen media use to no more than 2 hours per day, avoid TV and Internet access in children's bedrooms, and limit nighttime screen media use to improve sleep.[31] Conversely, hospital rooms are equipped with televisions and readily available entertainment media. Studies done >30 years ago determined that television viewing among hospitalized children was higher than among nonhospitalized children, with TV watching as the predominant diversionary activity for hospitalized children.[32–34] Since then, there has been a tremendous increase in the variety of television programming and in the availability of other screen media, such as video games and handheld devices.[1] To our knowledge, there has been no study in the past 3 decades to determine the extent or characteristics of media use among hospitalized children, against the backdrop of these changes.

This study was conducted to measure utilization of screen media during daytime hours by hospitalized children, to explore caregiver (parent or other guardian) perceptions of screen media use, and to compare home screen media use with hospital use. We hypothesized that caregivers would report their children engaged in more screen use when hospitalized compared with home. We also analyzed data to determine if increased screen use was associated with demographic characteristics, isolation restrictions, and/or lack of access to other diversionary activities, such as the playroom being open or visitors in the patient's room.

METHODS

Setting

This study was conducted at a single tertiary care children's hospital within a hospital on the inpatient unit with 44 beds, of which 40 are private rooms, and every bed with its own TV and remote control. Video game consoles, tablet computers, laptops, and handheld devices are available to hospitalized children in their rooms on request from Child Life or can be brought by patients and families. There are 2 playrooms, open for discrete 2-hour blocks 3 times daily on weekdays and for 3 hours on Saturdays and Sundays. Children are not required to have a caregiver accompany them to the playroom. The playrooms are accessible to children without isolation restrictions and Child Life activities are provided within the child's own room or private playroom sessions for those with isolation precautions. There are 6 Child Life specialists and ~5 volunteers daily who assist with Child Life activities in the playroom or engage in Child Life activities in the child's room. The playrooms are not equipped with screen media.

Subjects

A convenience cohort of hospitalized children on the inpatient unit over 2-week periods in September 2013, March 2014, and April 2014 was enrolled. Caregivers consented to participation in the study and completed the Caregiver Survey. Caregivers were not required to be present at the bedside during observations.

For the Caregiver Survey and this study, television was defined as including television, cable, movies, and DVDs, and non-TV screen media was described as handheld video games, video game consoles, and smartphones, tablets, and computers being used for entertainment media and/or not related to school work.

Study Design

Study investigators developed the Caregiver Survey (Supplemental Appendix 1), an 11-question Likert-type scale survey to describe screen use at home, in the hospital, and perception of the child's screen media use. The survey was available in English and Spanish. The Caregiver Survey was piloted for readability and time to complete with caregivers who were not part of the final study sample. The authors revised the survey based on feedback. We did not assess caregiver health literacy, but the survey was judged to be at an eighth grade reading level by using the Flesch-Kincaid readability test. Caregivers completed the consent and Caregiver Survey, before direct observations of screen use.

Study investigators also developed the Observation Tool Supplemental Appendix 2) to record data from 1-minute observations performed by 1 of 4 trained study personnel. Observations occurred once during each of 4 predetermined 2-hour time periods, distributed between 8 AM and 9 PM, every day of the week. Study participants were not blinded to the observer's role; however, to minimize the effect of observations on screen-using behavior, observations were conducted immediately on entering the hospital room. Study personnel were individually trained by the primary study investigator on the first day of data collection, and tested on the accuracy of their recorded observations by comparison with recorded observations by the primary investigator with hospitalized children not enrolled in the study. The primary investigator was available throughout study period for any questions, and observation data were entered into

Excel (Microsoft, Redmond, WA) by the primary investigator.

Observation Tool data were categorized into (1) screen media on and child attending to screen, (2) screen media on in background, or (3) screen media on and child asleep, or combined to describe observed total screen media use in attending to screen and screen on in background while child awake and asleep (Fig 1). Observers also recorded if the patient was in the room, alone or with hospital staff or visitors at the time of observation, or if the patient was not in the room.

The University of California Los Angeles Institutional Review Board approved the study protocol.

Data Analysis

Categorical data, such as child directly attending to screen or screen on in background, were reported as frequencies and proportions. Descriptive statistics, including mean, median, SD, and range, were reported for continuous and count data.

A set of potential predictors, including demographic characteristics (age, gender, race, health insurance, and income), no screen media in child's room at home, isolation for infectious status, and child alone in the hospital room, were evaluated by a generalized estimating equation (GEE) method for association with total observed screen media use (yes/no) in the hospital. Total observed screen media use was defined as "yes" if any of the following were true: background screen media was on and patient asleep, the TV was on and patient attending to TV, background screen media was on and patient awake. The GEE method was also used to evaluate the association between child being in their room and the playroom being closed. Results were reported as odds ratios (ORs) and the corresponding 95% confidence intervals (CIs).

Data from the Caregiver Survey were used to compare home and hospital screen use by Wilcoxon signed rank test. The association between at-home screen media access, as reported by Caregiver Survey, and total observed hospital screen media use (yes/no) was evaluated by using the GEE method and reported as ORs.

A $P < .05$ was considered statistically significant. All analyses were done by using SAS, version 9.2. (SAS Institute, Inc, Cary, NC).

RESULTS

In total, 275 hospitalized children were approached by the primary investigator. Children were excluded if the caregiver was not literate in English or Spanish or, if after 2 attempts, not present to complete the Caregiver Survey. Children were also excluded for severe immunocompromise, preventing safe participation in the observational survey. Ninety-six caregivers agreed to participate in the study and 51 caregivers declined to participate. Analysis was based on 96 hospitalized children, with 1490 total observations (Fig 2). Participants in this study ranged from 4 months to 20 years

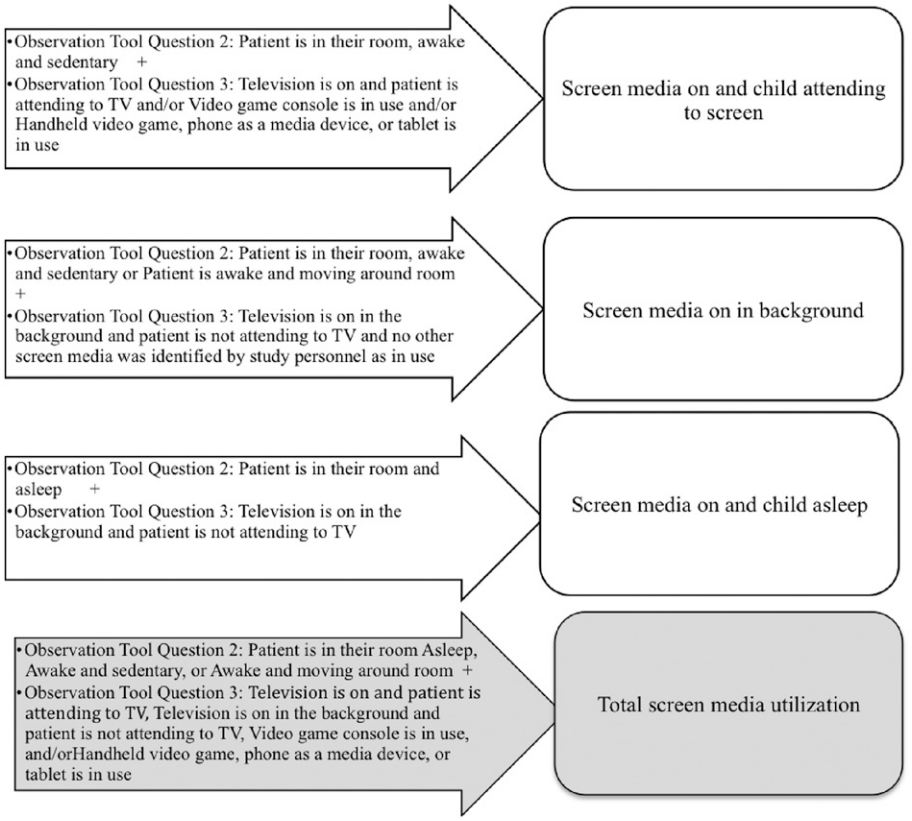

FIGURE 1 Categorization of observed screen time use with data from Observation Tool questions 2 and 3.

with a mean age of 8.95 years (SD 5.98 years) (Table 1).

Study participants were observed a median of 10.5 observation points (range 1–74). Total observed hospital screen media use was identified as "yes" for most daytime observations in all age groups. For ages 0 to 2 years, screen media use was observed in 59.9% of observations; for 3 to 5 years, 63.6% of observations; 6 to 10 years, 74.8% of observations; 11 to 15 years, 87.8% of observations; and 16 years and older, 74.5% of observations. Although all age groups were using screen media for a large portion of daytime, the likelihood of screen use increased with age (OR with age as a continuous variable = 1.04, 95% CI 1.01–1.08, $P = .011$).

Demographic characteristics of age, gender, race, insurance type, and income on total observed screen media use (Table 2) found Asian, Hispanic, and other/unknown race categories associated with less screen use and no significant difference in screen use between white and black race. Gender, health insurance status, and income were not associated with observed screen media use.

Hospitalized children were in their room 93.6% of observation times. Screen media use was present in 80.3% (range 0%–100%) of observations when the child was awake, with direct attention to the screen in 47.8% (range 0%–100%) and awake with screen media on in background in 32.5% (range 0%–100%) of observations. Study participants were found to be asleep with screen media on in 43.6% of daytime observations.

Of study participants, 35.6% ($n = 32$) were in isolation and 64.4% ($n = 58$) were not in isolation. The odds of being outside of the room for isolated verses nonisolated children was not significant at 0.76 (95% CI 0.44–1.33, $P = .34$). As shown in Table 2, there was no statistically significant difference in observed screen media use between children in isolation and children not in isolation. There was also no significant association between observed screen use in children alone in their hospital room and those with hospital staff or visitors in their room at time of observation.

The playroom was open 41.4% of observation times; however, children were in their hospital rooms 91.4% of the observation times when the playroom was open. Despite the high rate of children being in their hospital rooms at all times, hospitalized children were significantly more likely to be in their room when the playroom was closed (OR 1.81, 95% CI 1.14–2.88, $P = .012$).

In the Caregiver Survey, caregivers reported their children engaged in more TV (Fig 3A) and non-TV screen time (Fig 3B) when in the hospital as compared with home. Of caregivers surveyed, 46% reported their child watched >2 hours of TV on weekdays at home versus 70% reporting >2 hours of TV in the hospital ($P < .0001$). More caregivers also reported >2 hours of non-TV screen time in the hospital, as compared with home on weekdays ($P = .019$).

When asked to describe the quantity of screen use by their child when hospitalized, 54% of caregivers ($n = 50$) reported that their child's use of screen media was "at the right amount," 23% ($n = 22$) reported "a little more than I would like," and 19% ($n = 18$) as "much more than I would like."

In the home setting, Caregiver Survey found 46% of children have televisions in their room, only 13% have video game consoles, and 29% of caregivers reported no screen media in the child's room at home (Table 3). By Caregiver Survey and observation data, nearly 100% of hospitalized children had access to screen media in their hospital room. Computers and tablets were reported to be more common in the child's room at home versus in the hospital room. Caregivers reported that during the hospitalization their child engaged in Child Life activities in their room (49%), in the

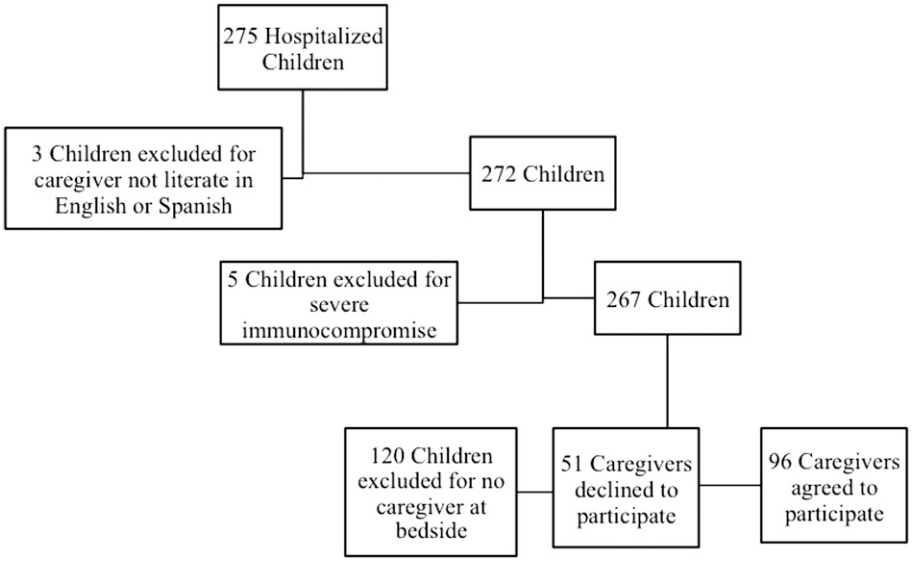

FIGURE 2 Flow diagram of study participants.

TABLE 1 Descriptive Demographic Data of Hospitalized Participants ($n = 96$)

Characteristics	*n* (% frequency)
Age, y	
0–2	19 (20)
3–5	18 (19)
6–10	16 (17)
11–15	25 (26)
16	18 (19)
Boys	51 (53)
Girls	45 (47)
Race/Ethnicity	
Asian	7 (7)
Black	10 (10)
Hispanic	49 (51)
Caucasian non-Hispanic	25 (26)
Other/Unknown	5 (5)
Health insurance	
California Children's Services	42 (44)
HMO or PPO	42 (44)
Medi-Cal	11 (11)
None	1 (1)

HMO, health maintenance organization; PPO, preferred provider organization.

TABLE 2 Regression Analysis via GEE to Evaluate Association Between Demographics and Characteristics With Total Observed Hospital Screen Media Use

Effect	OR	95% CI	*P*
Age, y	1.04	1.01–1.08	.0106
Gender			
Boys	Reference	—	—
Girls	0.83	0.59–1.18	.30
Race			
White	Reference	—	—
Asian	0.41	0.24–0.72	.0019
Black	1.18	0.70–1.99	.54
Hispanic	0.54	0.30–0.96	.0344
Other/Unknown	0.36	0.17–0.75	.0070
Insurance			
None	Reference	—	—
CCS	1.11	0.42–2.99	.83
HMO or PPO	0.86	0.40–1.84	.70
Medi-Cal	0.83	0.30–2.29	.71
Income (in 1000 dollars)	1.00	0.99–1.00	.34
Isolation for infectious status			
Isolation	Reference	—	—
Nonisolation	0.77	0.52–1.14	.19
Isolation socially			
Alone in room	Reference	—	—
Hospital staff or visitor in room with child	0.87	0.72–1.06	.16

CCS, California Children's Services; HMO, health maintenance organization; PPO, preferred provider organization.

playroom (41%), and in nonmedia activities such as reading books (33%) or did school work (16%). Materials associated with nonmedia activities were less readily apparent during observations of children in their hospital room, with arts and crafts noted in 17.3% of observations, books in 15.8%, and board games or puzzles in 7.4% of all observations. Regression analysis showed no association between at-home screen media access and observed in-hospital screen media use, with children whose caregivers reported no screen media in the child's room at home having no significant difference in total observed screen media use in the hospital, as compared with children whose caregivers reported screen media in the child's room at home (OR = 1.02, 95% CI 0.66–1.58, $P = .94$).

DISCUSSION

We found that hospitalized children were engaged in screen media or had screen media on in the background most of their day. In this study, screen media was used in 80.3% of observations of awake children, with children directly attending to the screen in 47.8% of observations. Screen media was used more often than not during observed hours of 8 AM to 9 PM, and was on during daytime sleep.

This study found that hospitalized children have access to TV and other screen media in their hospital room, spend most daytime hours directly attending to screen media or with screen media on in the background, and may have screen media on during daytime sleep. High screen media use could interfere with sleep,[5,6] eating,[15,16] and mood,[10,12,14] thereby affecting healing and recovery.[20–22] Hospitalized children are increasingly medically complex, with chronic conditions that require more frequent and lengthy hospital stays.[34] For children with frequent and/or extended hospital stays, the hospital, like home and school, is an environment that influences the patient's physical, cognitive, and emotional development.

Despite access to the playroom, children were found to be in their rooms during nearly all observations. Patients may feel too ill to leave their rooms, may feel most comfortable within their room, or caregivers feel more comfortable with the child within the hospital room. We did not ask children or their caregivers if their current medical condition resulted in a preference to stay within their hospital room. An alternative explanation could be the influence of screen media on childhood play and that the increase in sedentary activity and screen media usage seen in the general pediatric population is seen in hospitalized children. Additionally, as reported by caregivers, children have greater access to screen media in their hospital rooms as compared with home, which may further encourage children to stay in their room and use screen media.

Caregivers reported that their children engage in significantly more screen media use, both television and non-TV screen

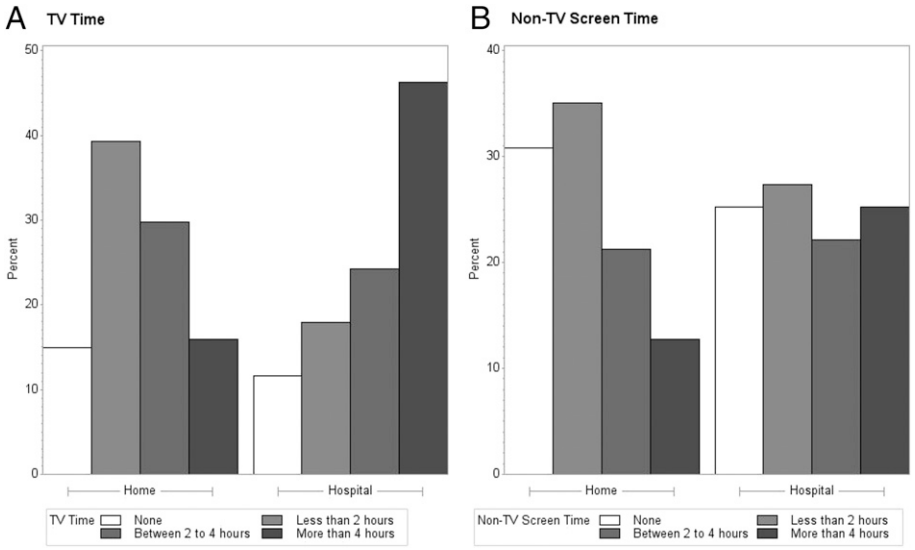

FIGURE 3 Comparison of caregiver description of hours of TV use (A) and non-TV screen media use (B) at home versus in the hospital.

media, when hospitalized. Previous studies have shown that television watching is a common diversion activity for hospitalized children.[35,36] Patients may rely on screens to escape boredom, loneliness, and emotional distress, and to provide comfort and familiarity. Some television programming has been shown to promote academic skills,[37] and interactive media, such as learn-to-read apps and electronic books, may be useful in maintaining or advancing skills.[38] Smartphones and tablets are increasingly used to help distract pediatric patients and reduce anxiety during medical and surgical procedures.[39,40] Although there may be benefits of interactive handheld screen media usage, there is an acknowledged paucity of research regarding the impact of these media on child learning, behavior, distraction from distress, and parental engagement. The ubiquitous presence of these devices necessitates further guidance from professional bodies. Future studies to identify reasons why hospitalized children are using screen media during most daytime hours may allow the development of guidelines for media use, as well as nonmedia strategies to provide hospitalized children with better comfort and coping skills.

Importantly, 42% of caregivers interpreted the quantity of screen media used by their child when hospitalized is more than they would like. Even for those children whose caregivers reported no screen media access in the child's room at home, these children were observed to have similar high frequency of screen media use in the hospital. This suggests that even when caregivers recognize that screen use should be limited, they do not enforce the same restrictions when the child is hospitalized. As hospitals become increasingly focused on patient- and family-centered care, it is important to consider that caregivers themselves may have concerns about the quantity of screen media their child is using during the hospitalization. Hospitals should consider family-centered design and input regarding placement and availability of screen media in the hospital environment.

Children's hospitals have a responsibility to create a therapeutic environment for optimal healing and recovery. For frequently hospitalized children and also for children who experience 1 lifetime hospitalization, pediatricians may be missing an opportunity to share with patients and families important information about the health effects of screen use. Encouraging high-quality sleep and limiting activities that contribute to distress, depression, aggression, and obesity are within the scope of therapeutic care provided in hospital settings. To create child-centered healing environments and ensure optimal physiologic and psychologic functioning, hospitals should consider following guidelines similar to those the AAP provides to caregivers[31]: to limit total noneducational screen use to no more than 2 hours per day, avoid putting TV sets and Internet connections in children's rooms, and limit nighttime screen use so as to improve sleep. Organizational strategies, such as implementation of hospital policies, in-hospital curfews, and contracts between families and providers, could encourage adherence to behaviors shown to be important for a child's physical and mental well-being. Providing increased access to nonmedia family-centered activities, inside and outside the patient room and inside and outside of the playroom, also should be considered. Decreasing in-hospital screen media use will require engagement of nursing and support staff, and education of families about the detrimental effects of excessive screen use. The expertise of Child Life specialists, whose primary role is to focus on the well-being of children while promoting optimal development and minimizing the adverse effects of children's experiences in hospital settings,[40] will be crucial to identifying activities and support strategies to replace screen use.

Limitations of this study include a small sample size with only 35% of patients able

TABLE 3 Description of Media at Home and Hospital Room as Described by Caregiver From Caregiver Survey, and Hospital Room as Observed by Study Personnel

	n (% frequency)
Caregiver Survey, *n* = 96	
Description of media availability in bedroom at home	
Television	44 (46)
Video game console	12 (13)
Handheld video game	10 (10)
Computer	24 (25)
Tablet	27 (28)
Smartphone	26 (27)
Other electronic media device	6 (6)
No screen in room	28 (29)
Description of media or other activities available in hospital room	
Television	94 (98)
Video game console	31 (32)
Handheld video game	7 (7)
Computer	13 (14)
Tablet	15 (16)
Other electronic media device	9 (9)
Child Life activities (art projects and therapeutic toys) in patient room	47 (49)
Child Life activities in playroom	39 (41)
Interaction with other children	13 (14)
Reading books	32 (33)
School work	15 (16)
Other activities	7 (7)
Observations, *n* = 1490	
Description of media or other activities available in hospital room, as noted by study personnel	
Television	1484 (99.6)
Video game console	94 (6.3)
Handheld video game, smartphone, tablet	439 (29.5)
Radio or music equipment	53 (3.6)
Books	235 (15.8)
Arts and crafts	258 (17.3)
Board games or puzzles	110 (7.4)
Other (plush toys, blocks, other toys)	627 (42.1)

to participate in the study and observations made only during daytime hours. Home screen use was ascertained by Caregiver Survey and may be subject to recall bias. The study was done during months when children are generally in school, which may introduce bias into caregiver perception of screen use. This study did not differentiate hospital screen use by content or educational value. Caregivers were not asked to identify reasons for increased screen use in the hospital setting, such as illness severity, boredom, anxiety, or lack of other diversionary activities. Additionally, this study was mainly a descriptive study to better understand screen use in hospitalized children in the setting of ready access to a variety of screen media. Future studies are needed to determine the effect of screen media use on the physical and mental health of hospitalized children, assess the content of screen media, and identify the reasons for increased screen use in the hospital.

We recognize that although acutely ill, children may not be able to actively engage in usual activities that stimulate development. We also recognize that using screen media in lieu of other diversionary activities is detrimental to healthy development and perhaps to healing and recovery. This study shows that hospitalized children are engaged in screen use for more hours than recommended for healthy development, and that caregivers have concerns about the quantity of hospital screen use. Pediatricians and children's hospitals should consider developing guidelines for screen use in the hospital and make available other diversionary activities to improve quality of life for hospitalized children.

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