Tablet Computer Use at the Bedside in a New Patient/Family Education Program

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ABSTRACT

This article discusses various educational interventions implemented in a new patient/family education program at the University of South Alabama Children's & Women's Hospital in Mobile, Alabama, for patients and family members of those newly diagnosed with pediatric cancer and other chronic illnesses. Tablet computers were made available to access reputable, easy to understand health resources during the educational processes upon diagnosis and continued treatment at the hospital. *MedlinePlus*, Patient Education Institute's *X-Plain* videos and other National Library of Medicine resources were available at the bedside and while receiving chemotherapy infusions. Surveys were developed to determine the efficacy of the educational interventions.

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Introduction

As discovered in a systematic review on educating newly diagnosed pediatric oncology patients and their family members, best practices for delivery of education are unknown. Although there were no known effective or appropriate strategies providing education to this patient population, several recommendations have been provided as to content, timing of education, and methodology, as well as identifying factors that may inhibit comprehension of information (1). In other studies, factors such as stress, high readability level of information and the sheer volume of information presented have been identified as barriers that impede parents from absorbing important information (2). The presence of too much medical jargon within the documentation provided to parents was another hurdle that prevented them from understanding the materials (3, 4). Information that parents need must be presented in easy language so that the understanding of complex medical information can be obtained, even by those who are higher level learners (5). Parents have revealed that, not only was it difficult to absorb all the information provided upon the initial hospital admitting because of the shock and overwhelming nature of the diagnosis, but they received a lot of irrelevant

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and outdated information (3). What parents really needed was relevant and updated information at the time of diagnosis, written in laymen's terms that is easy to read and comprehend (3).

A report from a Children's Oncology Group (COG) Expert Panel outlines the scarcity of evidence-based practices that are needed for effective patient/family education in pediatric oncology. The panel provided recommendations to those who provide education to this patient population from the evidence they did have, along with expert consultation, so that *potentially better practices* could be formulated to address the lack of evidence-based practices in patient/family education (6). The panel identified five key principles that could be used to gather more evidence to inform best practices in this area. These address the fact that when a child is diagnosed with cancer, it is overwhelming for the family and as such, the best type of environment to increase retention of information is one that is supportive and family centered. Not only should the education occur at the time of diagnosis, but as the child is cared for during treatments and therapies across the continuum of care. For the family to be ready to take care of their child at home, the quality of teaching must be consistent with this goal and, in a large way, will determine the parent's ability to care for their child. The panel also stressed the importance of individualized instructional methods to account for various learning styles of the parents addressing literacy rates, culture, language barriers and emotional state of being (6).

In another study, parents did not find using the Internet to be useful as the information they found was outdated and frightened them about their child's diagnosis. Parents could not determine the authority of the sites and many were filled with medical jargon they could not decipher. Given all these obstacles, they decided to abandon that method of locating information and used websites that were provided to them by the health care team; however, in some cases parents indicated that the websites provided were outdated as well (3).

Background of project

Based on these research findings, the author sought ways to assist pediatric cancer patients and their families learn more about their condition and help them grasp and understand the complex information they receive upon diagnosis. The literature strongly suggests room for improvement in this area and as a result, development and implementation using a variety of educational strategies for a new patient/family education ensued at the University of South Alabama Children's & Women's Hospital.

The Medical Library Association's (MLA) vision and core values lies in the belief that access to quality health information improves health care decisions for all. MLA is an advocate for public access and use of quality health

information which is vital to improved health (7). To that end, the goal of the program was to help families achieve a better understanding of the diseases that were afflicting their loved ones so that they could make informed decisions about their child's health care. This would be achieved using accurate and reliable resources incorporating a variety of learning styles and reading levels.

As the Information Services/Outreach Librarian at the University of South Alabama (USA) Charles M. Baugh Biomedical Library, the author's work extends to facilities within the USA Health System specifically, the USA Children's & Women's Hospital. Meeting with various nurse educators and child life specialists (CLS) within the pediatric and hematology and oncology units showed that each unit had a unique way of providing education using documents from a variety of sources. The Neonatal Intensive Care Unit (NICU), however, has a different approach to patient education that includes a formal discharge class that is required by parents to complete. The discharge class, conducted by the nurse educator, also includes a health literacy component taught by a librarian. Access to a well-organized resource room equipped with several iPads and a library of various printed resources on premature birth topics is available to all parents. The iPads have specific neonatal Web sites bookmarked so that parents can easily access the resources at any hour of the day. The NICU education program is very successful and the nursing staff are very dedicated to ensure that parents are fully educated on all aspects of their child's care while in the hospital and upon discharge.

After reviewing the current educational processes, a formal program to provide access to accurate and reputable resources from the National Library of Medicine using tablet computers at the bedside was created, under the premise that individualized education with easy access to the most reputable consumer health resource would assist in the information gathering process and enhance the interaction with the health care team.

A proposal was generated and submitted to the hospital administration by the USA Biomedical Library Outreach Librarian to develop a program where multiple educational interventions for patient/family education would be introduced to accommodate various learning styles. There were three goals:

- (1) Provide patients, parents and family members of those newly diagnosed with pediatric cancer and other chronic illnesses a means to acquire and use reputable health resources during the educational process upon diagnosis and treatment of their illness while at the hospital
- (2) Provide a multi-faceted, interdisciplinary approach to patient/family education

- (3) Assess various educational interventions in patient/family education to determine effectiveness

Resources from the National Library of Medicine (NLM), specifically *MedlinePlus*, and the National Institutes of Health (NIH) would be the basis for the education program. Access to, and use of, these resources with Android tablet computers would contribute to better patient health care outcomes from the beginning stage of diagnosis throughout the continuum of care. Parents could begin to understand the complex terminology that was presented to them in a language that was not filled with medical jargon. Resources could be used throughout their hospital stay which would enable repetition and reinforcement at various stages of the delivery and acceptance of the diagnosis.

As a commitment to quality family centered care at USA Children's & Women's Hospital, the ability for patients and parents to have access to quality health information with the assistance of a medical librarian and other health care professionals would help diminish the anxiety and stress over learning complex conditions and procedures; thus, empowering them to acquire a better understanding of their child's diagnosis resulting in better decision making regarding their child's treatment plan and care.

The USA Children's & Women's Hospital Administration was very supportive of the goals of program. Funding was sought from the National Network of Libraries of Medicine Southeastern Atlantic region (NNLM SEA) to initiate the project. As a result, a \$5,000 Technology Improvement Award was received that enabled the purchase of nine Android tablets and rolling bedside stands for use in patient/nurse educator point-of-instruction (POI) sessions, educational purposes with child life specialists, use by patients in the outpatient infusion area (USS HOPE) and individual or group instructional sessions conducted by a librarian. The hospital administration, nurses, child life specialists and other hospital staff were instrumental in the execution of the program.

Team members and units served

Several units of the hospital were identified where the program would be most beneficial. The USS HOPE unit was identified as the most ideal location to initiate the program. This unit provides chemotherapy and other infusion treatments for pediatric and adolescent patients. It is in the USS HOPE where treatment plans are discussed with the parents by the physicians and subsequently commenced. Treatments can last anywhere from four to seven hours and all staff identified this as an opportune time for patient education. Educating the parent and other family members about the child's condition, treatments, and medications could easily be accommodated, thus supporting

the COG's panel recommendation that various family members be a part of the education process (6). Parents, grandparents, siblings and other family members sit by the patient's side in the USS HOPE and participate in the education. This arrangement allows parents and family members to absorb information when they are mentally capable in a less stressful situation, as many parents don't remember receiving information during the initial meeting with physicians (4).

Discussions with nurses and hospital administrators led to the designation of other units that would be included in the initial program. This was based on each unit's need for resources and their willingness to participate in the project. As a result, a total of five units were included in the program: pediatric (PEDS), hematology/oncology (HEM/ONC), pediatric intensive care unit (PICU), neonatal intensive care unit (NICU) and the USS HOPE. The program was developed on an incremental scale to determine the efficacy of the resources and methods used, and if successful, additional units could be added. Since the NICU had an established parent education program they were eager to participate and add more resources to their curriculum.

A small team of nurses and child life specialists from these areas were identified to assist in the implementation of the program. There were three lead nurses and one child life specialist who were instrumental in assisting with the promotion and execution of the program to the floor nurses. Organizing and planning meetings with a few key personnel was much easier than with a larger group. Everyone was eager to have additional patient education resources and as a result, 100% participation was achieved at all meetings and communication among all was very effective. Once the program was implemented, the team ensured that data were gathered on its progress through surveys that were developed.

Training

Training sessions were conducted for the nursing staff of each unit to become aware of the program objectives and implementation. Becoming familiar with the Android tablets and learning how to use *MedlinePlus*, *X-Plain* videos and other NLM resources was accommodated through multiple day and night sessions. All nurses were held accountable for attending the sessions and continuing education (CE) credits were provided which greatly increased attendance. There was a total of seven sessions, which reached 52 nurses and three child life specialists.

Program resources

Nine Samsung Android S2 32GB 9.7" tablets with protective cases and security cables were purchased along with rolling bedside stands for

educational use by patients and the health care team. The tablets are used in conjunction with each unit's patient education procedures from initial diagnosis throughout the course of treatments and patient's hospitalization, by nurses, nurse educators, and child life specialists. Upon admission, the patients in the oncology and hematology unit receive large amounts of complex information that can be very overwhelming to the patient and their families. With the use of the Android devices, nurses and the project librarian can refer parents to *MedlinePlus* to locate information on their child's condition, review terminology and procedures and locate other medical information on their own time while at their child's bedside. Parents can also increase their knowledge in the continual care of home-based procedures while gaining a better comprehension of their child's condition. This can be done across the continuum of care and expose the parents to multiple avenues of educational experiences because many of the pediatric oncology patients have numerous inpatient and outpatient visits.

Access to NLM and NIH resources, specifically *MedlinePlus*, *Genetics Home Reference*, *Genetic and Rare Diseases Information Center* and the Patient Education Institute's *X-Plain* video products are the main components for education. Icons placed on the home screen provided shortcuts for ease of access to these and other websites. Being able to read material that is provided in nonmedical terminology enables parents to comprehend complex conditions much more easily. Written with the consumer in mind, these resources help the families understand various procedures, diseases and medications that their child has been prescribed. Links to other reputable resources within *MedlinePlus* that are designated as *Easy to Read* also assist those who have lower literacy rates. Short medical encyclopedia articles, images and diagrams also assist with the visual learning that many parents need. Because *MedlinePlus* provides multiple links to many reputable resources, this enables parents to see that it is the best resource for health information—as most everyone indicated they performed a Google search to locate health information on their child's diagnosis. Resources from reputable organizations that parents never knew existed are now easily accessible. Finding a few key organizations that provide valuable information is what parents really want and need. Information found in multiple languages also helps the non-English-speaking parents. Linkouts to *HealthReach* were invaluable when locating documents in Vietnamese for one family member.

Many of the patients in the USS HOPE unit have rare diseases, so access to NIH *Genetics Home Reference* and NIH *Genetic and Rare Diseases Information Center* became a lifeline to many. A wealth of information was found for those who had been seeking information for quite some time, as many of the cases are extremely rare and information is scarce. Frequency of symptoms associated with the disease, along with patient advocacy groups and genetic testing links were among some of the most helpful resources.

Inheritance patterns also led parents to valuable information on genetic factors in a language they understood. The genetic primers available in *Genetics Home Reference* were also very helpful providing basic information on genes, chromosomes, and DNA. Links to additional research associations and other educational resources were invaluable and exposed some very sophisticated and international resources to the parents. Not having to wonder if the sources were reputable or authoritative, and the fact that parents could really understand the material, became a key component in returning to these databases. Putting families at ease while providing valuable information at a time when they could mentally absorb the material validated the major goal of the project.

The tablets are configured to connect to the hospital network so patients can access all the materials without having to navigate through the hospital's guest WiFi login procedures. This makes Internet connections much more streamlined and effective. The tablets are not configured for printing capabilities and, due to privacy issues, email access is restricted. Since the devices are stored on rolling stands they can be easily moved to the patient's room or used in any area of the hospital during the course of their stay. The tablets have a protective case with a security cable to lock the device to the stand which deters theft ([Figure 1](#)).

Figure 1. Tablet computer on rolling stand with protective case and security cable.

Reputable information from NLM and NIH are no doubt very valuable resources for patient education. However, the use of simple health video products can also enhance the comprehension of complex conditions and provide a means of reinforcing home-based care procedures that many parents are faced with after they leave the hospital (4). Quality health videos produced by the Patient Education Institute, known as *X-Plain* videos, have been in place with open heart surgery patients at the USA Health University Hospital for several years and have proven to be very successful in assisting health care professionals in the educational process. These videos are very well produced, explain procedures and conditions in an organized and simple manner without medical jargon, and have a high patient satisfaction rate in the comprehension of complex procedures. The videos, short in length, are produced with graphics and illustrations that are also culturally sensitive. A notation is made in the patient's record which allows the healthcare team to know that video health education has taken place.

Because of the positive feedback and successful results with heart patients at USA Health University Hospital, this educational intervention was added to the new patient/family education program at the USA Children's & Women's Hospital. There were 288 unique titles chosen with 68 of those in Spanish for a total collection of 356 *X-Plain* videos. The health videos were selected from the *X-Plain* library collection by the nurses based on the diagnoses, conditions and procedures most seen and conducted within the units. The videos, downloaded on the tablets for ease of access, eliminated any problems of Internet connectivity within the hospital.

The self-paced interactive tutorial feature of the videos allows users to engage in the learning process. Branching questions are provided with corrective and reinforcing feedback (Figure 2). Users can review the material

Figure 2. Project librarian with parent responding to questions using *X-Plain* health videos in the USS HOPE unit.

as many times as needed so that total comprehension can be achieved. Facilitating various learning styles using the *X-Plain* videos helps accommodate low literacy rates identified with some of the population served in the hospital community. Moreover, it addresses the need for repetition of information, as parents forget what was discussed during the initial diagnosis (4). Large fonts, simple and clear language, along with illustrations, help simplify content while providing an effective patient engagement teaching modality. Family members and patients attain greater comprehension of complex conditions that facilitate thinking of questions for the health care team. The videos, used in conjunction with *MedlinePlus*, are viewed with or without the nurses present. The video intervention saves staff time and promotes better communication between the patient and provider which can result in improved health outcomes.

While technology can assist family members in locating quality information and reinforce concepts in a very easy format, providing information in the form of a bookmark or brochure can also help parents and patients remember where to go when they need to access information. Printed brochures, bookmarks and magazines provided by the National Library of Medicine are also an integral part of the education process. Brochures on accessing *MedlinePlus*, *Genetics Home Reference*, *Genetic and Rare Diseases Information Center*, *Drug Information Portal*, and *Mobile Resources available through NLM* are just a few that are distributed. These are provided to parents during the initial education session and are housed at the nurses' station (Figure 3). Copies of the *NLM MedlinePlus Magazine* featuring articles that are relevant to families, such as Crohn's disease, sickle cell

Figure 3. Project librarian providing print materials to mothers of patients in the USS HOPE unit.

disease and asthma are also provided. Display cases were purchased to house the materials outside of the USS HOPE waiting room where other family members and patients can retrieve the materials.

Instruction by units

Each unit received multiple tablet computers for patient education depending on their need. Since the NICU had iPads in place, adding the additional resources on the devices was easy to implement. Since many of the babies stay in the NICU for several weeks, even months, parents have access to the iPads to consult *MedlinePlus* or other appropriate resources, as well as the ability to view the videos. The education is provided to the parents by the NICU nurse educator who takes an active role in exposing the parents to all the new resources. iPads on the rolling stands are taken to their private rooms or unit pods and can be used as long as needed. Access to these devices in the NICU education resource room is also available. Detailed genetic database instruction from *Genetics Home Reference* or *Genetic and Rare Diseases Information Center* is provided by the project librarian on a consultation basis.

The instruction in the USS HOPE unit is led by the project librarian. Weekly one-on-one instructional sessions are provided to parents and adolescent patients. Upon diagnosis, parents receive large binders of information from their health care team that is written in medical terminology and is not well understood by the parents, especially at a time when they are emotionally drained by the diagnosis. The unit has eight stations where patients sit up to seven hours as they begin their chemotherapy, blood or IV infusions. The majority of patients are small children, so parents do not leave their side. Because patients spend long hours in the unit receiving treatments, the timing and location was ideal for focused instruction. The project librarian helps guide parents through the variety of resources available and demonstrates how to locate information on the condition, drugs that are prescribed, and genetic resources for rare diseases (Figure 4). Links to other organizations and resources through the NIH are extremely helpful to all the parents. Access to the tablets and resources are available any time during their infusions and can be used long after the initial session took place. Because of the secure location, these tablets are not used with the rolling stands. They are stored in a locked cabinet and can be retrieved at any time by the unit nurses. These patients return on a regular outpatient basis so parents can locate a variety of information at their convenience and when they have many hours of unscheduled time. Printed materials are distributed during the instructional session and are also available in display cases outside the unit. These become very valuable resources as they are passed on to other family members. Many parents indicate that other family members search

Figure 4. One-on-one instruction with parent and project librarian in the USS HOPE unit.

the Internet for information, each coming up with a myriad of sources, not knowing if it is accurate or not. Distributing printed bookmarks and brochures that direct searchers to *MedlinePlus* helps alleviate the problem of locating unreliable information through random Google searches. All family members can use the same reputable and current resources, which becomes very important, not only in the beginning stages of the information retrieval process, but throughout various stages of treatment.

The pediatric and hematology/oncology units provide one-on-one education to newly admitted patients by the admitting nurse or other nursing staff. The tablets are brought into the patient's room on the rolling stands and nurses then demonstrate how to locate information from *MedlinePlus* and select health videos from the *X-Plain* video collection. Tablets are checked out near the nurses' station with log books keeping track of the location of the devices. Each unit also keeps a selection of brochures, magazines, and bookmarks to distribute to families.

To provide as many educational opportunities as possible, the integration of weekly instructional sessions in family resource rooms throughout the hospital was another educational intervention that was implemented. Two family rooms sponsored by the Ronald McDonald House were available for these sessions. The rooms had sitting areas for parents and family members to watch television, eat snacks or sleep in large recliners. The idea was to make the instructional sessions very informal and near the patient's room. The curriculum was tailored to discuss and demonstrate the use of *Medline Plus*, *Genetics Home Reference*, *Drug Information Portal*, cancer specific related Web sites, and other relevant information to the family members

present. Although the concept seemed appropriate and was well advertised, no one attended the sessions. It was hoped that within the close proximity to the patient's room, parents could easily attend. However, it was discovered that parents did not want to leave the room with their sick child for even a few minutes.

Evaluations

One of the underlying goals of the project is to provide research on what types of educational methods and interventions are effective to pediatric cancer and other chronic illness patients and their families. To reach this goal, surveys were developed to obtain data that would assist in identifying effective evidence-based practices in patient/family education. These surveys, entitled, Initial Education Survey and Discharge Evaluation of Educational Interventions, document how many patients and families are served and determine the efficacy of the various instructional activities and resources used by the parents to their overall understanding of their child's diagnosis and treatment.

The Initial Education Survey includes demographic information that is used to determine the patient population and general diagnoses. General diagnosis data is tracked to seek future funding for educational resources of the more common diagnoses. The surveys are in print form and completed by the nurses after the educational session. These forms are then collected and compiled on a regular basis by the project librarian.

Reviewing the literature to determine the effectiveness of patient education among pediatric oncology patients revealed that video use in the educational process had not been evaluated (1). Therefore, engaging patients in an assessment survey of this type of intervention was essential to determine the effectiveness of the *X-Plain* videos. As part of the Initial Evaluation Survey, three questions were developed to determine the efficacy of the health videos. The questions determine how much the patients knew about their condition before they watched the video and if they had a better understanding of the condition or procedure after viewing the video. To facilitate a better provider/patient communication with more structured questions, a final question is asked to determine if the information in the video prompted them to think of questions for their health care team.

The Discharge Evaluation of Educational Interventions survey is completed by the parents upon their child's discharge. This survey is for patients who are admitted to the hospital and does not include out-patient infusion patients in the USS HOPE. USS HOPE patients do not have a formal discharge because they come and go frequently. The survey asks questions regarding the convenience of using the tablets, increased confidence in finding quality health information, materials being available in their native language, the continued use of the resources and the consistency of

information throughout the patients hospital stay. Since there are multiple educational interventions employed in this project, determining which patient education interventions are effective while in the hospital is also assessed.

Initial Education Survey results

From March to December 2017, there were 96 instructional sessions that served 133 people in the NICU, PEDS and USS HOPE units. Of that population, 26% were patients, 53% were mothers, 11% fathers and 10% were other family members which consisted of grandmothers, brothers, boyfriends, and aunts.

Of these 96 sessions, 43 video sessions took place with a total of 64 videos viewed. In some instruction sessions, multiple videos were viewed. Thirty-eight survey responses were received with an 88% response rate. A five point Likert Scale was used to determine the degree of agreement.

Before viewing the video, patients were asked how much they felt they knew about their child's diagnosis, procedure or care. The responses showed that 16% reported that they knew nothing, 29% reported that they knew a little, 47% reported that they knew quite a bit and 8% reported that they knew completely about the diagnosis or procedure (Figure 5). After viewing the video, we asked if the information in the video gave them a better understanding of the diagnosis, procedure or care. The responses were the following: 34% Strongly Agreed, 61% Agree and 5% No opinion/uncertain (Figure 6). The last question in the sequence asked whether or not the information in the video helped them think of questions to ask their healthcare providers. There was 58% agreement (13% strongly agree

Figure 5. Responses to 1st video survey question.

Figure 6. Responses to 2nd video survey question.

and 45% agree) that it did prompt them to think of questions. Thirty-seven percent had no opinion or were uncertain (Figure 7).

What is interesting to note, is that although 55% knew a considerable amount about the condition or procedure before watching the video (Figure 5), there was 95% agreement that the information in the video gave them a better understanding. (Figure 6), This is encouraging because many people indicated that they learned a lot from the videos and that the information either confirmed or validated information they had read or heard from their health care team. Many parents indicated that they wished they had had access to the videos before as it would have helped them understand what to look for and things they might encounter in the future. Moreover, some parents indicated that they learned some unsettling information, however, they were glad to know about the new information. Additionally, with 58% indicating that the videos did help them

Figure 7. Responses to 3rd video survey question.

think of questions for their health care team (Figure 7), the questions they would ask would be more focused and direct, rather than vague and obscure.

Based on the survey responses, it is evident that the *X-Plain* video intervention greatly enhanced the parent's and patient's comprehension of the diagnosis on all levels and prompted them to ask more direct questions of the physicians, nurses or other health care professionals. This intervention enables the parents to be more proactive and responsive in a positive and engaging way. The videos reinforced concepts discussed at the initial education session by the nurse educator and also supports the principles outlined by the COG Expert Panel recommendations to create a supportive environment for learning (6). The videos also address the need to provide education that is understandable and culturally sensitive, as many titles are available in Spanish. The use of these videos provide supportive evidence of an effective means of education in the area of newly diagnosed pediatric cancer patients.

Discharge Evaluation of Educational Interventions results

The Discharge Evaluation of Educational Interventions survey was used to determine how well patients and parents liked the use of the resources from the NLM/NIH and the use of the Android tablets.

A total of 39 surveys (40% response rate) were received from NICU, pediatric and the hematology/oncology units from March through December 2017. The findings are reflected in Table 1.

Additionally, a final question was asked of the parents to check various activities listed that they felt helped them learn more about their child's health issues and as a result helped them address their needs upon leaving the hospital. The results were the following:

- Fifty-one percent responded to the activity of the introduction of *MedlinePlus* by the health care professional team
- Forty-six percent responded to the activity of using the printed brochures and pamphlets
- Thirty-six percent responded to the activity of using *MedlinePlus* and other health resources on computer tablets at any time during their hospital stay
- Twenty-one percent responded to the activity of using the printed health magazines (NIH *MedlinePlus*)
- Ten percent responded to the activity of weekly *MedlinePlus* instruction sessions by the librarian, while 10% responded to the instruction sessions on specialty databases by the librarian

Although the number of respondents was low ($n = 39$), it is evident from this data that the project was successful. Data supporting the preferences of information resources and the educational activities parents like to engage in

Table 1. Discharge Evaluation of Educational Interventions Survey Results.

Question	Strongly Agree	Agree	No Opinion/ Uncertain	Disagree	Strongly Disagree
I liked the convenience of using the computer tablets to locate quality resources on my child's health issues.	61.5%	25.6%	12.8%	0%	0%
Searching <i>MedlinePlus</i> has given me more confidence locating quality health information about my child's issues.	58.9%	25.6%	15.3%	0%	0%
I like the ability to read and view health material in my native language.	61.5%	28.2%	10.2%	0%	0%
I will continue to use the resources and tools I learned.	56.4%	30.7%	10.2%	0%	2.5%
The health information provided was consistent throughout my stay.	61.5%	28.2%	5.1%	2.5%	2.5%

will help others develop successful patient/family education programs. The fact that all parents liked the ability to use the Android tablets to locate quality health information while in the hospital is encouraging because many may not have access to computers at home or know how to use them. Data supporting the fact that parent's confidence level in locating quality health information increased by using *MedlinePlus* is also encouraging. It is also noteworthy that 46% of the respondents used the printed materials that were provided to them. These were bookmarks, brochures and pamphlets all produced by NLM or NIH. Print publications are still important in patient education, whether it is a small bookmark, pamphlet or magazine. The printed materials are a useful reminder of a Web site or database and can be passed on to other family members or friends who may help with the care of their loved one. Many family members assist in the caregiving and welcome any type of resource that provides accurate and helpful information. All of the parents were very pleased to know where they could go to locate more current and reliable information and not depend on Google for their health information.

Consistency of information provided across the continuum of care to the patient and their families is key to an effective education protocol. It is important in all aspects of patient education that all health care team members know what information is being taught so that reinforcement of concepts can be made (6). The education provided to the parents using *MedlinePlus* and the *X-Plain* videos was consistent and of utmost authority. Nurses use these tools to reinforce terminology and concepts they introduce to the parents and provide an excellent method of teaching home care procedures where parents can review the material as many times as needed. The use of the health videos also enables parents to become more familiar and proficient in home care and safety issues. Data from the surveys indicate that 89.7% of the parents agreed that the health information provided was

consistent throughout their stay in the hospital. This is very encouraging and validates the use of all the resources in this new patient education program as well as the consistent information provided by the health care team.

Observations and future projects

What was discovered to be most successful in this project was the staffing of a nurse educator to provide education to the patients and family members in the NICU and the individualized education by the project librarian in the USS HOPE unit. The pediatric and hematology/oncology units did not have nurse educators, so education was provided by the floor nurses, which is not as consistent within the NICU and the USS HOPE. The lead nurses of the pediatric and hematology/oncology units were very supportive and provided the education as needed, but sometimes with limited staffing, the tablet was not used. Incentives for the nurses on these floors were initiated to help increase patient education with these resources, and hopefully this will impact the use on these particular units in the future.

The PICU was one area where we found the devices were not used as often as anticipated. After a one-year trial, the team decided to reassign the tablets to the surgical pre- and postoperative area where they can be used in a different environment and where patient education resources are needed. In this new setting, patients and family members preparing for surgery can review and learn about their upcoming procedures and receive postsurgery information.

With continued effort, this project hopes to provide additional data to develop evidence-based practices in patient/family education and expand the use to other units of the hospital. From the initial success of this project, a second NNLM SEA Technology Improvement Award was sought and received in May 2017. With the additional funding, the use of tablet computers and rolling bedside stands has expanded to all units within the USA Health University Hospital and two additional units at the USA Children's & Women's Hospital—High Risk OB/GYN and Mother Baby. This will create opportunities to gather and analyze more data and provide education to a more diverse population served by the two hospitals.

Conclusion

Access to quality health information using Android tablets has been successful for patient education at the USA Children's & Women's Hospital and is now an essential part of the educational process. Integrating technology to address various learning styles has led to a greater comprehension of information and increased confidence levels of patients and parents locating information from the National Library of Medicine and the National Institutes of Health.

Instruction in the use of quality medical resources from the National Library of Medicine and other reputable organizations can result in better care for the patient. Better informed parents make better decisions for their child and with the addition of guided instruction this has greatly enhanced the use of quality medical databases in the course of treatment.

Multiple educational interventions have enhanced patient and family understanding of very complex conditions under extremely stressful situations. Parents are pleased with the ease of use, depth of information and most importantly, the readability of the information. Inclusion of written materials, health videos, and reputable, easy to access websites has engaged patients in an interdisciplinary team approach to medical care that has proven to be successful while achieving high patient satisfaction in the educational process. *MedlinePlus*, and other NLM resources along with the use of the Patient Education Institutes *X-Plain* video products are of the utmost authority and reputation providing clear, easy to understand information addressing language barrier issues and being culturally sensitive.

Enabling patients/families to comprehend information when they are capable of doing so after the initial shock of diagnosis has enhanced the education process. With the adoption of the program, the USA Children's & Women's Hospital has provided evidence of educational interventions and factors that positively influence the comprehension of the vast information disseminated upon these newly diagnosed cancer patients, chronically ill patients and their families. Improving the understanding of a diagnosis and condition for a patient, assisting in the continual care of home-based procedures, potentially reducing the number of readmits to the hospital and improving the overall health for the patient will lead to improved health outcomes for all involved.

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References

1. Rodgers CC, Laing CM, Herring RA, Tena N, Leonardelli A, Hockenberry M, Hendricks-Ferguson V. Understanding effective delivery of patient and family

- education in pediatric oncology: a systematic review from the children's oncology group. *J Pediatr Oncol Nurs*. 2016;33(6):432–46. doi:10.1177/1043454216659449.
2. Matutina R. Educating families of children newly diagnosed with cancer. *Cancer Nurs Pract*. 2010 Feb;9(1):26–29. doi:10.7748/cnp2010.02.9.1.26.c7548.
 3. Aburn G, Gott M. Education given to parents of children newly diagnosed with acute lymphoblastic leukemia: the parents' perspective. *Pediatr Nurs*. 2014 Sept/Oct;40(5):243–56.
 4. Eden OB, Black I, MacKinlay GA, Emery AEH. Communication with parents of children with cancer. *Palliat Med*. 1994;8(2):105–14. doi:10.1177/026921639400800203.
 5. Bastable SB. Literacy in the adult client population. In: Bastable SB 3rd, editor. *Nurse as educator: principles of teaching and learning for nursing practice*. Sudbury (MA): Jones and Bartlett; 2008. p. 253.
 6. Landier W, Ahern J, Barakat LP, Bhatia S, Bingen KM, Bondurant PG, Cohn SL, Dobrozsi SK, Haugen M, Herring RA, et al. Patient/family education for newly diagnosed pediatric oncology patients: consensus recommendations from a children's oncology group expert panel. *J Pediatr Oncol Nurs*. 2016;33(6):422–31. doi:10.1177/1043544216655983.
 7. Medical Library Association. Vision, values, and mission [Internet]. Chicago (IL): Medical Library Association; 2018 [cited 2018 Dec 5]. Available from: <https://www.mlanet.org/p/cm/ld/fid=21>.