

**Childhood Drowning: How Can Healthcare Providers Help?**

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### Abstract

**Introduction:** Drowning is the leading cause of death in children between 1 and 4 years of age; in Arizona drownings are double the national average for this age group. The goal of this Doctor of Nursing project was to educate and empower pediatric providers to give quality drowning prevention (DP) anticipatory guidance (AG) to caregivers of children between 1 and 4 years of age at every well exam.

**Method:** This quality improvement (QI) project included 32 providers from six pediatric clinics in Arizona. A one-hour education session focused on drowning prevention followed one month later by a a thirty-minute follow-up feedback session were conducted. Pre- and post- education surveys were administered at the first session to measure perceived previous and future intended DP AG practice. An additional follow-up survey was administered at the second session to evaluate perceived change. In addition, caregivers were contacted and surveyed one to three months post initial education to assess provider delivery of AG. Likert-scales and descriptive statistics were used to evaluate data sets.

**Results:** Post-educational intervention, providers reported increased intention ( $p = 0.027$ ) to provide water safety AG, and increased intention ( $p < 0.001$ ) to connect water AG to developmental milestones. Post-intervention follow-up indicated an increased provision of developmentally specific water safety AG to caregivers ( $p < 0.001$ ) and increased connection of developmental milestones in AG ( $p = 0.016$ ). Barriers that prevent water safety AG were reported as time constraints and other perceived AG of higher priority.

**Implications:** This QI project adds to the literature and demonstrates the benefit of education to invigorate and empower increased provision of quality DP AG from providers.

**Keywords:** drowning, drowning prevention, anticipatory guidance, pediatric, water safety

### **Childhood Drowning: How Can Healthcare Providers Help?**

Drowning is a leading cause of injury-related death and disability in children. The consequences include extensive loss of function, increased caregiver dependency, loss of future potential, or death. The negative impacts of drowning extend beyond familial grief to include financial burdens for caregivers and the health system.

#### **Problem Statement**

From 2016 to 2018 there were 1,289 drowning related hospital admissions in Arizona; 871 of these admissions were in Maricopa County. Of these admissions, 751 were children between 1 and 4 years of age (Arizona Department of Public Health Services [ADHS], 2019). Drowning rates are double the national average for children from 1 to 4 years of age in Arizona (Centers for Disease Control [CDC], 2019). Many risk factors that increase drowning have been identified. According to the ADHS (2018), accessibility to a pool, lack of proper supervision, and substance use were identified as the top preventable causes of drowning deaths. Other high-risk factors include young age, male gender, and race. Knowledge deficit, distraction, intellectual disability, low socioeconomic status, and stressful life events also increase the risk of child drowning (American Academy of Pediatrics [AAP], 2019; Isaacson, 2018).

Drowning awareness and prevention programs have been in place for decades; however, inconsistent messages have focused on pool barriers, swimming lessons, and caregiver supervision. Katchmarchi et al. (2018) performed an analysis of drowning prevention educational resources used in the United States (U.S.). These researchers found heterogenicity in messages presented, with 88% of educational resources promoting swimming lessons and 100% discussing some form of supervision. Brenner et al. (2009) reported an 88% drowning risk reduction in children 1 to 4 years of age after receiving formal swimming lessons. Swimming

lessons have value and add one layer of protection to drowning prevention but, does not “drown proof” a child (AAP, 2019). Clear and consistent evidence-based drowning prevention education and messaging is necessary but lacking in the U.S.

### **Purpose and Rationale**

Drowning is a devastating and preventable cause of injury and death in children. Despite prevention efforts, the drowning death rate for children between 1 and 4 years of age in Maricopa County has continued to increase over the last three years (ADHS, 2018). The purpose of this legacy Doctor of Nursing Practice (DNP) project, initiated by a previous DNP student, is to continue to investigate childhood drowning, the role and constraints of pediatric providers, and translate evidence-based, efficient interventions into the primary care setting that enable primary care providers (PCPs) to provide evidence-based drowning prevention AG to caregivers.

### **Background and Significance**

#### **Pediatric Providers**

Primary care providers (PCPs) are considered experts and trusted by caregivers to guide the health and well-being of their children (Hwang et al., 2016). The AAP recommends health screening, physical evaluation, and the provision of AG specific to the child’s age and development at each preventative well-child visit (Hagan et al., 2017). Anticipatory guidance includes over 20 talking points for each visit based on the Bright Futures Guidelines (Hagan et al., 2017). Time constraints pose a challenge to PCPs who consequently limit quantity or quality of education provided (Gittelman et al., 2015; Hagan et al., 2017; & Venkataramani et al., 2017). Providers are less likely to discuss AG topics if they are less knowledgeable about the topic or if the topic is regarded as a lower priority. Pediatric providers are key to drowning prevention efforts in their role as educators and advocates (AAP, 2019).

### **Prevention Education**

Anticipatory guidance, provided by pediatric and family medicine PCPs, is a discussion technique that has been successful in giving information to parents and guardians. This education and guidance strives to promote positive health behaviors. Clear, consistent information and instruction when given at a time that is meaningful and applicable to a child or family situation, has the highest probability of retention and translation into practice by caregivers (Hagan et al., 2017). As an example, the “back-to-sleep” campaign endorsed by the AAP and pediatric providers to address sudden infant death syndrome (SIDS) in the 1980s, decreased the rate of SIDS by 50% in 10 years (Schaeffer & Asnes, 2017). Additional safe sleep recommendations have been updated since that time. Sleutel et al. (2018) created a simple mnemonic using A, B, C’s, printed onto crib cards which were placed on the cribs of all newborns hospitalized. Nurses reinforced the “back to sleep” message with newborn discharge instructions. The intervention demonstrated statistical significance for improving parents’ recall of safe sleep instructions (Sleutel et al. 2018). Clear and meaningful messages, materials, and education contributed to the success of these interventions.

### **Lack of Formal Education**

Absent or low-quality water safety AG from the PCP potentiates the need for parents to seek advice from other sources (e.g., the internet) which increases exposure to mixed messages and misinformation. A google search was performed asking, “do swimming lessons decrease the risk of drowning in children?” and the first Google offering quoted Brenner et al. (2009) reporting there is an 88% risk reduction in drowning after swimming lessons. This is the only study completed to evaluate swim lessons relationship to drowning. The age and developmental level of the child is not included and there was a very low confidence interval with a very small

sample size in this study (Brenner et al. 2009). Huynh et al. (2017) performed a qualitative observational study of how the perception of risk influenced parents and caregiver's supervision of their child on a playground. The researchers found decreased risk perception was associated with increased distractibility behaviors such as looking at their phone, looking away from the child, and talking with other parents. In addition, floaties, puddle jumpers, and other floatation devices are advertised as protective swim aides, creating a false sense of safety for caregivers. Parents often regard swimming lessons as protection against drowning (Isaacson, 2020). Erroneous or incomplete messages that create a false sense of security increases the chance of caregiver distraction and drowning risk.

### **Desired Future State**

Children from 1 to 4 years of age are especially vulnerable to drowning because of natural curiosity and lack of danger awareness (AAP, 2019). The CDC (2019) developed a national action plan for child injury prevention to raise awareness, highlight prevention solutions, and mobilize action. The AAP (2019), American Red Cross (2020), and National Drowning Prevention Alliance (2011) highlight the importance of “layers of protection” and the “chain of survival” for water safety education because a single strategy should not be relied on for drowning prevention.

As trusted advisors to parents and guardians, PCPs are in a position to affect positive change through evidence-based education; however, time constraints and other patient and caregiver needs affect the type, quality, and quantity of teaching provided. Clear, consistent, meaningful education and messages are necessary for caregivers to translate evidence-based drowning prevention into practice.

### **Internal Evidence**

A large children's hospital in Arizona held a workshop to educate caregivers on water safety and drowning prevention strategies. Caregivers were surveyed prior to the workshop in 2017, 2018, and 2019. The results indicated that 16%, 14%, and 18%, respectively, believed a child 1 to 4 years of age would instinctively know how to swim without having swimming lessons (Isaacson, 2018). In 2018 and 2019, 68% and 82% of caregivers, respectively, believed children who had swim lessons would be able to self-rescue (Isaacson, 2019). Post-intervention surveys after the workshop revealed a significant improvement in caregiver expectation of a child's ability to swim or self-rescue.

### **PICOT Question**

This initial literature review has led to the PICOT question, for pediatric providers, does providing developmentally specific injury prevention education, compared to no formal education, improve the dissemination of anticipatory guidance to caregivers of children 1 to 4 years of age?

### **Search Strategies**

An exhaustive search of the literature of three databases, PubMed, Cumulative Index of Nursing and Allied Health Literature (CINAHL) and PsycINFO, was completed to answer the PICO question. Search databases were selected based on their relevance to health care and evidence-based peer-reviewed articles. Keywords included: *pediatric, pediatrician, healthcare providers, primary care, pediatric clinic, education, anticipatory guidance, counseling, intervention, injury prevention, water safety, drowning prevention, unintentional injury, injury, accidental injury*. Combinations of keywords yielded relevant articles in all databases. Titles and abstracts were reviewed on search yields of less than 200. Primary studies or interventions

focused on pediatric providers or pediatric patients, and injury prevention were saved for in-depth evaluation and rapid critical appraisal.

An initial search of PubMed included keywords *pediatrician* and *anticipatory guidance* and produced 176 results. Results were filtered for publication in the last five years, and results were narrowed to 37. Combinations of keywords, *pediatrician, provider, primary care, pediatric, education, counseling, anticipatory guidance, education, water safety, drowning, injury*, were entered to maximize article yield. After initial review for relevance, 13 publications were saved for further evaluation.

An initial search of CINAHL included keywords *pediatric* and *injury prevention* and resulted in 966 articles. *Education* or *anticipatory guidance* was added narrowing the results to 263. A filter for a publication date in the last five years narrowed yield to 71 articles. Combinations of additional keywords, *pediatric provider, pediatric clinic, child, water safety, and drowning prevention* were added, and results were evaluated individually. Seven publications were saved for further evaluation.

An initial search of PsycInfo started with a combination of keyword phrases, *healthcare providers OR pediatricians OR pediatric OR primary care AND injury prevention OR water safety OR drowning prevention AND anticipatory guidance OR counseling OR intervention* and yielded 438 results. A filter was applied to include only peer-reviewed articles published in the last five years and narrowed the search results to 113 articles. Combinations of keywords were applied, and results were evaluated. Ten publications were saved for in-depth evaluation.

Article titles and abstracts were appraised on search yields of 200 or less. Duplications of publications were removed. An in-depth review of 18 publications was completed, and



references were hand searched. Rapid critical appraisal was completed, and the 10 most relevant primary studies were selected (see Appendix A, Table 1).

### **Critical Appraisal and Synthesis of Evidence**

The studies were organized on an evaluation table for critical appraisal (see Appendix A, Table 1). There is a limited number of available studies on pediatric injury prevention. The evidence strength ranged from level I to level IV (England Will et al., 2015; Gittleman et al., 2018; Gittleman et al., 2015; Habermehl et al., 2019; Johnson, 2015; McCallin et al., 2020; Roberts et al., 2019; Silva et al., 2016; Wang et al., 2018; Zonfrillo et al., 2018). There was heterogeneity in the study designs and measurement instruments. The majority of interventions took place in the pediatric clinic setting; however, two studies were community-based. Included in this literature review are: four level I, two randomized controlled trials (RCTs), and two systematic reviews (SRs); one level II prospective study (PS); three level III quasi-experimental studies (QES), and one level IV cohort study (CS) (see Appendix A, Table 1). Nine of the studies provided pediatric injury prevention through educational interventions for pediatric providers or caregivers; and one SR evaluated effective strategies to promote provider behavior change.

Caregiver injury prevention education interventions included AG from a pediatric provider during well-child visits (Gittleman et al., 2018; Habermehl et al., 2019; McCallin et al., 2020; Zonfrillo et al., 2018), group or individual sessions from non-healthcare providers in and out of the clinic setting (England Will et al., 2015; Habermehl et al., 2019; Roberts et al., 2019; Wang et al., 2018), and a mobile phone application (Roberts et al., 2019). In addition to formal education, six of the studies used teaching aids such as handouts, videos, or a mobile application (England Will et al., 2015; Habermehl et al., 2019; McCallin et al., 2020; Roberts et al., 2019; Wang et al., 2018; Zonfrillo et al., 2018). Dependent variables across all caregiver interventions

were knowledge or behavior change. Evaluation of interventions were completed primarily through pre- and post-tests or surveys; however, two of the groups used formal observation (see Appendix A, Table 2). There is potential for bias in studies that used self-reported behavior change; however, all parent interventions reported a significant increase in knowledge or injury prevention behavior change.

Four studies were provider focused (Gittelman et al., 2018; Gittelman et al., 2015; Johnson, 2015; McCallin et al., 2020), and three provided injury prevention education with monthly follow-up conferences and peer collaboration (Gittelman et al., 2015; Gittelman et al., 2018; McCallin et al., 2020). In contrast, one SR assessed effective means of promoting positive behavior change in providers (Johnson, 2015). Two studies included screening tools in addition to provider education (Gittelman et al., 2018; Gittelman et al., 2015). Two provider education interventions assessed the amount or frequency of AG provided and screening tool use (Gittelman et al., 2018; Gittelman et al., 2015), and two evaluated caregiver behavior change (England Will et al., 2015; Roberts et al., 2019), (see Appendix A, Table 2). All authors reported a significant increase in the quantity or frequency of injury prevention AG provided and provider interventions that assessed caregiver knowledge or behavior change also had a significant increase in knowledge or injury prevention behavior change.

Johnson et al. (2019), a provider intervention, and England Will et al. (2015), a caregiver intervention, evaluated different message framing to promote a behavior change. Both authors found that providing information that included the rationale for the desired behavior is the most effective strategy to elicit positive change. Although there was heterogeneity in the study designs, valuable information was garnered from this review of the literature.

The review of evidence emphasized the role and feasibility of education as a strategy to promote water safety and pediatric drowning prevention. Education interventions for providers demonstrated the increased provision of the quality and quantity of injury prevention AG to caregivers. Injury prevention AG education significantly improved caregiver safety knowledge and behavior. Screening tools and teaching materials used in conjunction enhanced the frequency and quality of AG. Provider and caregiver commitment to pediatric injury prevention efforts are necessary; therefore, interventions should provide a clear, meaningful rationale to inspire a behavior change.

### **Theory Application and Implementation Framework**

The Theory of Planned Behavior (TPB) has been used to explain or predict an individual's responses or behaviors (see Appendix B, Figure B1). The Theory of Planned Behavior postulates that individual behavioral change is dependent on both desire and ability (Ajzen, 1991). Six constructs that signify an individual's control over their behavior include attitude, intention, subjective norms, social norms, perceived power, and perceived behavioral control (Ajzen, 1991). The Theory of Planned Behavior is applicable to guide drowning prevention interventions for providers and caregivers because this theory can be used to understand and facilitate behavior change.

The Theory of Planned Behavior was used to guide development of the intervention. Pre- and post-intervention surveys assessed the providers perceived ability to provide water safety AG to parents. A power point presentation highlighted the problem of childhood drowning and inspired intention to increase water safety AG provision. Developmentally specific water safety AG handouts empowered the providers to give quality evidence-based water safety AG to caregivers of children between 1 and 4 years of age.

The Stetler model was selected to guide the pediatric water safety and drowning prevention intervention practice change process. The Stetler framework was chosen because it is a five-step evidence-based practice model that provides a clear roadmap for the project (see Appendix B, Figure B2). Phase I, preparation, was completed through meetings with a local pediatric hospital injury prevention specialist and evaluating her acquired soft data. An exhaustive literature search of the problem was completed in this phase. Phase II, validation, included a critical appraisal of the literature and the creation of an evidence table (Appendix A). Phase III, comparative evaluation/decision making, required analysis and synthesis of the evidence to determine what practices should be implemented based on the best evidence. Retrieved evidence underscored the effectiveness of drowning prevention education and the use of screening tools and teaching materials to increase provider knowledge and quality and quantity of AG provision. The evidence also revealed best practices to increase caregiver injury prevention knowledge and safety behaviors. Phase IV of the Stetler model focuses on translation/application, which helps guide the implementation of the intervention which was delivered at provider lunch and learn sessions. Phase V focuses on evaluation of the intervention in order to assess for changes that may need to happen to make the intervention more successful in the future (Stetler, 2001).

### **Methods**

An evidence-based provider water safety, drowning prevention anticipatory guidance education intervention for PCPs was developed. The institution review board of Arizona State University and the project site approved this provider education project (See Appendix C). Thirty-two providers from six pediatric clinics affiliated with the project site in the Phoenix metropolitan area participated in the initial education session; and 16 providers attended the

follow-up touchstone session. Participation was voluntary and providers had the option to decline involvement at any time during the project.

An evidence-based PowerPoint® presentation on water safety and AG needs for caregivers was created for the initial education session (See Appendix D). Four, age and developmental specific, water safety handouts were created to be used by providers for delivery of AG to caregivers. Intervention materials also included a poster with water safety messages created to post on exam room walls, and sunscreen packets, with a water safety message, was developed for provider office dissemination. All resource materials were printed in English and Spanish versions. Four questionnaires with Likert scales were designed to measure change in pediatric PCPs delivery of water safety AG to caregivers (See Appendix E, Figures E1-E4). The first questionnaire was administered pre-intervention to assess provider baseline water safety AG provision behaviors, perceived barriers to including water safety in AG, and water safety messages given to caregivers. The second questionnaire was administered immediately post-intervention to assess intention and perceived barriers to the provision of water safety AG. Providers were given intervention materials (handouts, posters, and sunscreen packets) to use for AG provision and for dissemination to caregivers. One to three months post initial education session, caregivers of children between 1 and 4 years of age who had received well exams by the participating providers were contacted and surveyed to assess if water safety was discussed during the visit, and what water safety messages were received from the pediatric provider. Lastly, one to three months post initial education, a follow-up touchstone session was held with the participating providers. Providers were briefed on new research findings and given the opportunity to discuss their experience incorporating the resource materials into their AG

delivery. A final questionnaire was completed by PCPs to assess post intervention water safety AG provision frequency, perceived barriers, and messages frequently shared with caregivers.

A budget was estimated for direct and indirect costs of the project and does not include salary for involved project team members (see Appendix F). Direct costs include sunscreen packets and provider lunch served during initial and follow up sessions and estimated to be \$1,900. Indirect costs included provider time, facility meeting place, and in-kind support provided by partnered hospital for materials and translator totaling \$7,425. Funding was provided by the partnered hospital.

## **Results**

### **Provider Surveys**

A two-tailed Wilcoxon signed rank test was used to analyze pre- and post-test data from Likert scale questions, and descriptive statistics were used to analyze for change in water safety messages and perceived barriers to give water safety AG to caregivers. Pre- intervention and immediate post-education questionnaires were compared to assess providers intention to conduct water safety AG, and messages they plan to convey to caregivers at well child check's (WCC's). Immediately following the water safety education, providers reported increased intention to deliver water safety AG to caregivers ( $M = 4.46$ ;  $p = 0.027$ ); and increased intention to connect water safety AG with developmental milestones ( $M = 4.26$ ;  $p < 0.001$ ) (see Appendix G, Table G1). Providers indicated the following increased percentage gains from baseline on the increased intention to deliver the following evidence-based water safety messages to caregivers: designate which adult is supervising a child (39.8%), choose a supervisor who is capable (37%), ensure supervisor is within arm's reach of a child and able to see the child's face (37%), and after a brief turn, rotate the supervisor (51.1%), do not go to the pool with children when stressed or tired

(76.5%), keep CPR skills current (50.9%), understand that swim skills in this age group are limited and unreliable (35.5%), ensure children wear a properly fitted US Coast Guard approved life jacket, which looks like a vest, near a pool (59.6%), and keep a working pool fence in place to protect children during non-swim times (5.3%). There was a decrease in providers who intended to educate parents to enroll their children into swimming lessons (10.4%) (see Appendix G, Figure G2).

Provider pre-intervention questionnaires and provider follow-up touchstone session questionnaires were compared to determine post intervention change in frequency of water safety AG and messages that were consistently conveyed to caregivers during WCC's. Providers reported increased frequency in provision of water safety AG to caregivers from pre-test to post-test ( $M = 4$ ;  $p < 0.001$ ); and increased connection of water safety AG to developmental milestones pre-test to post-test ( $M = 3.38$ ;  $p = 0.016$ ) (Appendix G, Figure G1). Post-intervention there was an increase in providers who reported delivering evidence-based messages to caregivers. Gains from baseline were as follows: designate which adult is supervising a child (25.3%), choose a supervisor who is capable (10.4%), ensure supervisor is within arm's reach of a child and able to see the child's face (15.9%), after a brief turn rotate the supervisor (1.1%), do not go to the pool with children when stressed or tired (32.6%), keep CPR skills current (13.9%), understand that swim skills in this age group are limited and unreliable (17.3%), ensure children wear a properly fitted US Coast Guard approved life jacket (29.5%), which looks like a vest, near a pool, and keep a working pool fence in place to protect children during non-swim times (4.5%), educate caregivers to enroll their children into swimming lessons (12.2%) (Appendix G, Figure G2). Notably, on the pre-intervention questionnaire 9.4% of providers indicated they did

not routinely discuss supervision with caregivers. On the follow-up touchstone session questionnaire, no provider indicated they did not discuss supervision.

Barriers to provision of water safety AG was assessed in all three questionnaires completed by the providers; and there was minimal variation in results, indicating time is the most frequent barrier followed by providers considering other AG were of higher priority. Providers who attended the touchstone sessions indicated they “probably” or “definitely would” recommend this program to other primary care offices. Providers also believed this program was “effective” or “very effective” at increasing caregiver knowledge about drowning risk and safety behaviors.

#### **Caregiver Telephone Survey.**

Of the 93 caregivers that were surveyed, 33% reported their child’s provider discussed water safety at their last well visit, 38.7% reported they did not, and 28% could not remember. Of those caregivers who reported water safety discussions, 26.9% recalled education was during review of developmental milestones, 30.8% stated it was during general discussion, and 42.3% could not remember. Caregivers who discussed water safety with their child’s provider indicated the following messages were shared: supervision: designate (31%), supervision: choose an adult (20.7%), supervision: choose a person who can swim (17.2%), supervision: constant (58.6%), supervision: rotate (3.4%), keep a child within arm’s reach at all times (34%), CPR skills (24.1%), life jackets (34.5%), turn off cell phone at the pool (3.4%), avoid the pool when stressed or tired (3.4%), other (44.8%). When a caregiver indicated ‘other’ was discussed, a free text entry box opened, and caregiver response was documented. Two main topics were identified, “they asked if we had a pool...” or “we talked about swimming lessons...”. Six



caregivers (7.6%) reported receiving or discussing water safety resources while 63 (79.8%) did not, and 10 (12.7%) could not remember.

### **Discussion**

Providers reported significant increase in the delivery of water safety messages including “designate which adult is supervising a child”, “do not go to the pool when stressed or tired”, and “ensure a properly fitted US Coast Guard approved life jacket”. Messages such as “ensure supervisor is within arm’s reach and able to see a child’s face” and “keep a working pool fence” were increased; but, demonstrated less obvious change as a great percentage of providers initially reported delivering these messages on the pre-intervention questionnaire. Interestingly, there was a 10.4% decrease in providers immediately post-intervention who indicated they plan to advise parents to enroll their child into swimming lessons, and a 12.2% increase from pre-intervention baseline indicated on the touchstone session questionnaire. Participating providers indicated they would recommend this intervention to other providers and this program increases caregiver knowledge of drowning risk and water safety behaviors. Time and other priorities remain barriers to consistent water safety AG provision. Thirty-one caregivers recalled speaking about water safety during their child’s last well visit and messages correlate with the providers report.

Congruent with Gittelman et al. (2018), Gittelman et al. (2015), Johnson (2015) and McCallin et al. (2020), this DNP process improvement project successfully increased providers’ provision of evidence-based developmentally specific water safety AG to caregivers during WCC of children 1 to 4 years of age. Unlike Gittelman et al. (2018), Gittelman et al. (2015), and McCallin et al. (2020), who completed multiple education and follow up sessions over a long duration; this process improvement was conducted over a one-to-three-month time period with only one education session and one follow-up briefing with the participating providers. It is

unknown whether there will be continued and long-term change in providers delivery of water safety AG to caregivers. Since the inception of this project, Taylor et al. (2020) completed a systematic review to assess the effects of water competency skills for children 2 to 4 years of age in relation to drowning. The authors linked neurodevelopmental skill acquisition with swimming competency and readiness as children develop and reach milestones at different paces. The researchers found that swimming lessons may reduce drowning risk, but they should not be considered “drown proof” or expected to possess the ability to self-rescue in an emergency (Taylor et al., 2020).

### **Limitations**

Challenges and limitations were experienced during the implementation of this quality improvement project. The first lunch and learn session was in May 2020, just before the COVID-19 pandemic shut down where home isolation and social distancing was recommended. Originally, there were 11 pediatric clinics signed up to participate; however, many had to postpone or withdraw participation from the DNP project. Sessions were scheduled for the summer but had to be postponed into the winter timeframe. Originally, caregiver follow-up calls were set to be completed one to two months after the intervention and the follow-up touchstone session would be held two to three months post initial education session. Timelines were adapted and in person education was transitioned to online Zoom® meetings. Two clinics did not participate in the caregiver evaluation portion of the project. One clinic did not give permission for their patients to be contacted for the telephone survey, and another clinic joined the project late and only received the initial education session with pre and post questionnaires completed. After speaking with providers during the touchstone session and completing caregiver questionnaires, it was clear that resource materials were not being used as intended. One clinic

requested they be picked up because caregivers were leaving them in the exam rooms. Caregiver follow-up calls were particularly challenging as many could not recall what they spoke with the provider about. This was noted mainly when speaking with caregivers greater than 2 weeks after their child's appointment. Additionally, during the late fall and winter months, caregivers indicated more frequently that water safety was not discussed. Limitations of the project include evaluation through provider recall and self-report which increases the risk of bias. It is noted that the responses from the caregiver questionnaires revealed unreliable data to evaluate provider delivery of water safety AG as the caregivers often could not remember what was discussed during the well child visit.

Adaptations to this DNP quality improvement project are in process for ongoing sustainment, adaptation and growth of this provider water safety education project. Provider excitement and engagement during the initial education was indicated by a marked increased intention to deliver water safety AG messages to caregivers. Offering incentives such as maintenance of certification credits for a longer duration continuous process improvement may increase interest and continued involvement by providers. Additionally, quarterly evaluation and education on drowning prevention strategies and AG messages may renew providers' commitment to delivering quality evidence-based water safety AG to caregivers. Finally, provider documentation of water safety AG delivery to caregivers as a generic counseling, non-billable ICD-10 diagnosis code designated to this project would remove bias and evaluate success of the intervention.

The drowning death rate for children between the ages of 1 and 4 years of age is double the national average in Maricopa County and, despite prevention efforts, has continued to rise. As providers are a trusted source of information for parents, increased delivery of evidence-

based water safety and drowning prevention AG at every well child visit has the potential to positively impact the drowning rate. This provider focused education project adds to existing literature that demonstrates the effectiveness of provider education to increase delivery of evidence-based water safety AG to caregivers. Further research regarding effective means of prioritizing and increasing water safety AG during WCC's for providers within the time constraints allotted to a well child visit is indicated.

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## Appendix A

## Evaluation and Synthesis Tables

Table A1

## Evaluation Table Quantitative Studies

Citation	Theory/ Conceptual Framework	Design/ Method	Sample/ Setting	Major Variables & Definitions	Measurement/ Instrumentation	Data Analysis	Findings/ Results	Level/ Quality of Evidence; Decision for practice/ application to practice
<p>England Will et al. (2015). Examining the relative effectiveness of different message framing strategies for child passenger safety: Recommendations for increased comprehension and compliance</p> <p><b>Funding:</b> none reported</p> <p><b>Country:</b> USA</p> <p><b>Bias:</b> none listed</p>	<p>Emphasis Framing</p>	<p><b>Design:</b> RCT</p> <p><b>Purpose:</b> to determine the most effective communication technique to promote child passenger safety recommendations and which information should be emphasized.</p> <p>Examine effectiveness on caregiver knowledge, attitude and behavior intentions.</p>	<p><b>N:</b> 300 <b>n:</b> 58 CG <b>n:</b> 61 IG1 <b>n:</b> 60 IG2 <b>n:</b> 58 IG3 <b>n:</b> 63 IG4</p> <p><b>Setting:</b> Philadelphia, PA Norfolk, VA</p> <p><b>Demographics:</b> P or G of children B-12 YoA Inclusion: - ≥18YoA - P or G of child - &lt;12 YoA</p>	<p><b>IV1:</b> CSR T &amp; p – natural progression b-t <b>IV2:</b> CSR- T &amp; p- premature graduation <b>IV3:</b> CSR T &amp; p progression w/rationale <b>IV4:</b> CSR T &amp; p organized by age <b>CG:</b> no education: rated car seat preference <b>DV1:</b> Restraint selection <b>DV2:</b> Child passenger safety</p>	<p>Pre and Post survey</p> <p><b>M1:</b> Restraint selection: 8 item knowledge measure multiple choice questions. <b>M2:</b> Child passenger safety knowledge: Likert scale <b>M3:</b> Perceptions of efficacy &amp; threat: RBDS 5-point Likert-type scale <b>M4:</b> Attitudes &amp; intentions: 8-item attitude subscale and 9 item intentions</p>	<p>ANOVA, Pair-wise comparisons with Sidak's adjustment for multiple comparisons</p>	<p><b>M1 change:</b> Total main effect of flyers had significant effect (p &lt;0.001) but IV3 had greatest improvement in scores from pretest to post test. <b>M2 change:</b> Significant main effect (p =.03), IV2 and IV3 groups had greatest change. <b>M3 change:</b> Significant main effect of all flyers (p=0.01) for self-efficacy.</p>	<p><b>Level I</b></p> <p><b>Strengths:</b> Large sample size</p> <p><b>Limitations:</b> -Behavior not observed -Short time between pre and post tests -Controlled setting, participants compensated.</p> <p><b>Application:</b> Message framing that provided rational for the recommendations</p>

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			<p>- read English on computer screen</p> <p>- had transportation to site</p>	<p><b>DV3:</b> Perceptions of efficacy and threat</p> <p><b>DV4:</b> Attitudes and intentions</p> <p><b>DV5:</b> Judgements of relevance and acceptability</p>	subscale, Likert-type response		<p>IV2 demonstrated greatest change. No significant effect for threat perception.</p> <p><b>M4 Change:</b> significant main effect (p&lt;0.001) &amp; all IG &gt; CG</p>	produced the greatest change.
<p>Gittelman et al. (2018). A quality improvement program in pediatric practices to increase tailored injury prevention counseling and assess self-reported changes made by families.</p> <p><b>Funding:</b> Maternal Child and Health Bureau with the AAP. Grants: Tomorrows Funding and Ohio</p>	Quality Improvement PDSA	<p><b>Design:</b> Prospective Study</p> <p><b>Purpose:</b> Evaluate pre- and post- targeted pediatric provider IP counseling at WCV</p> <p>To determine if families self-reported behavior change after risk was assessed and discussion occurred with their PCP.</p>	<p><b>Sample:</b> N: 7 practices n: 39 providers n: 386 families n: 1858 initial screens n: 386 follow up screens</p> <p><b>Setting:</b> Pediatric practices in</p>	<p><b>IV: ST</b></p> <p><b>DV:</b> frequency of screening tool use.</p> <p><b>DV:</b> reported G behavior change after provider education at subsequent WCV.</p>	Pre and post screening	Comparison of pre and post survey answers from Gs.	<p>↑ discussion of IP AG from inappropriate response on ST from 0%-75% birth – 4 month screening &amp; 87% for 6-12 month screening</p> <p>Family demonstrated at least 1 behavior change after PCP recommendation on follow up visit.</p>	<p><b>Level II</b></p> <p><b>Strength:</b> Monthly conference calls to and webinar to review practice level and collaborative data, foster peer-to peer discussions, determine areas of success and improvement needs.</p> <p><b>Weakness:</b> -Physician received</p>

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Children's Trust Fund  <b>Country:</b> USA <b>Bias:</b> denied competing interest								participation incentives -self reported behavior change <b>Application:</b> Individualized IP education is effective means of improving caregiver safety practices.
Gittelman et al. (2015). A pilot quality improvement program to increase pediatrician injury anticipatory guidance.  <b>Funding:</b> Ohio Department of Public service-EMS injury prevention research grant  <b>Country:</b> USA	Quality Improvement Theory  Stetler Model	<b>Design:</b> Cohort study  <b>Purpose:</b> ↑ injury AG covered in WCV for child ≤ 1 YoA through offering of screening tools and focused talking points to pediatric providers.	<b>N:</b> 6 pediatric practices <b>n:</b> 720 chart review baseline pre intervention <b>n:</b> 499 chart review post intervention  (charts reviewed children < 1 year)  (2, 6, 9, & 12 months)	<b>IV:</b> ST  <b>DV1:</b> percentage of providers using screening tool  <b>DV2:</b> age appropriate AG topics covered at each WV	Random sampling of charts (Data review)	Frequencies  Measures table	↑ ST use (97%)  ↑ IP AG (>88% at each age group)	<b>Level IV</b>  <b>Strengths:</b> Monthly collaboration and feedback with 15 min lecture on IP topic.  <b>Weaknesses:</b> -physicians received participation incentives -family behavior change not assessed  <b>Application:</b> provider

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Citation	Theory/ Conceptual Framework	Design/ Method	Sample/ Setting	Major Variables & Definitions	Measurement/ Instrumentation	Data Analysis	Findings/ Results	Level/ Quality of Evidence; Decision for practice/ application to practice
<b>Bias:</b> None reported								education and provision of screening tool increased IP AG provision.
Habermehl et al. (2019). Injury Prevention Education in the Waiting room of an Underserved Pediatric Primary Care Clinic  <b>Funding:</b> MEDTAPP Healthcare Access Initiative and federal financial participation funds  <b>Country:</b> USA  <b>Bias:</b> Denied conflict of interest	Behavior change Theory (inferred)	<b>Design:</b> Quasi-experimental study  <b>Purpose:</b> Provide IP education to P & G outside of the WCV, evaluate efficacy of IP delivery and improve waiting room satisfaction.	<b>Sample:</b> N: 200 P or G with children 1-4 years of age  <b>Setting:</b> Underserved pediatric clinic waiting room	<b>IV:</b> IP toolkit with one on one session age-specific IP education  <b>DV:</b> IP knowledge change	Immediate post intervention survey  F/u phone survey 2 weeks later.	Descriptive statistics	<b>Immediate:</b> 94% P/G report learned new IP information  <b>2wk f/u:</b> 93% P/G reported changes to prevent injury.  93% used safety supplies in toolkit  42% purchased new safety equipment	<b>Level III</b>  <b>Strengths:</b> -Staff utilization for one on one education with take home tools and information. -freed provider time and used idol wait time to complete.  <b>Weaknesses:</b> Behavior change not assessed, self-report.  <b>Application:</b> one on one education with take home tool kit effective behavior change.
Johnson (2015). Promoting professional	Normalization Process Theory	<b>Design:</b> SR of SR	<b>Sample:</b> N: 67 articles that met	Persuasive	MEDLINE, CINAHL PsycINFO	Coded intervention type	Interventions based on action and education	<b>Level I</b>  <b>Strength:</b>

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Citation	Theory/ Conceptual Framework	Design/ Method	Sample/ Setting	Major Variables & Definitions	Measurement/ Instrumentation	Data Analysis	Findings/ Results	Level/ Quality of Evidence; Decision for practice/ application to practice
<p>behavior change in healthcare: what interventions work, and why? A theory-led overview of systematic reviews.</p> <p><b>Funding:</b> National Institute for Health Research; Economic and Social Research Council Grant</p> <p><b>Country:</b> United Kingdom</p> <p><b>Bias:</b> none reported</p>		<p><b>Purpose:</b> Establish characteristics of successful behavior change interventions in healthcare</p>	<p>inclusion criteria:</p> <p>patients &amp; healthcare professionals in SR who met inclusion criteria of having examined the effectiveness of professional interventions in improving professional practice and or patient outcomes.</p> <p><b>Setting:</b> Primary and secondary care offices</p>	<p>Educational and informational</p> <p>Action and monitoring</p>	<p>Cochrane Library</p> <p>Descriptive analysis</p>	<p>Intervention coded 'successful', 'unsuccessful', or 'not assessed'</p>	<p>greater effectiveness at creating professional behavior <math>\Delta</math> success than persuasion.</p>	<p>Large sample size</p> <p><b>Weakness:</b> heterogenous study samples</p> <p><b>Application:</b> Provider education and reinforcement strategies are effective in creating behavior change.</p>
<p>McCallin et al. (2020). A pilot study on water safety education of providers and caregivers in outpatient pediatric clinical settings to increase drowning</p>	PDSA	<p><b>Design:</b> Cohort Study</p> <p><b>Method:</b> QI pilot project- 2 PDSA cycles</p> <p><b>Purpose:</b> to engage pediatricians to</p>	<p><b>Sample:</b> N: 3 sites n: 42 providers n: 103 C PDSA1 n: 39 PDSA2</p> <p><b>Setting:</b> Community pediatric</p>	<p><b>IV:</b> ST</p> <p><b>DV1:</b> Provider behavior on discussion of water safety AG</p> <p><b>DV2:</b> Provider use of water</p>	<p>Pre and post intervention surveys Likert scale behavioral questions on water safety counseling practices &amp; drowning prevention</p>	<p>Comparison of pre and post survey answers of providers</p> <p>Comparison of P &amp; C PDSA1 &amp; PDSA2 scores.</p>	<p>↑ water safety counseling by physicians</p> <p>↑ provider &amp; C Drowning prevention knowledge &amp; water safety.</p>	<p><b>Level IV</b></p> <p><b>Strength:</b> long duration 8-12 months Conference calls every 1-2 months to evaluate process.</p>

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prevention knowledge.  <b>Funding:</b> Authors denied financial support. Collaborative project between Texas Drowning Prevention Alliance and Texas Pediatric Society  <b>Country:</b> USA  <b>Bias:</b> none reported		increase rate of drowning prevention counseling provided to families with children from 0-10 YoA & increase knowledge of providers and CG through education, resources, & materials.	practice and hospital based pediatric clinic in Texas	safety education material  <b>DV3:</b> Provider knowledge of water safety and drowning prevention  <b>DV4:</b> C knowledge of water safety and drowning prevention	knowledge questions.			Generalizable and replicable  <b>Weakness:</b> small sample size  <b>Application:</b> Provider education on water safety and drowning prevention is an effective means of increasing targeted water safety parent and caregiver education.
Roberts et al. (2019). Qualitative and quantitative evaluation of the make safe happen app: Mobile technology- based safety behavior change intervention for parents.	Behavior change theory (inferred)	<b>Design:</b> Quasi-experimental research  <b>Method:</b> 5 focus groups with pretest, posttest survey after 7-10 days, app utilization, and focus group discussions.	<b>Sample:</b> N- 40 P/G with children 0-12 YoA	<b>IV:</b> Make safe happen mobile app  <b>DV:</b> IP safety knowledge and home safety behaviors  <b>DV:</b> P/G rating of app feature	Pre and post multiple choice questions	Mean total safety knowledge score pre- & posttests.  Likert scale	↑ IP awareness & home safety behaviors from 63% to 81% at post-test (p<0.001)  4.5/5 rating of features for home	<b>Level III Strength:</b> -tailor IP info for age of child and customize for individual home features and specific to certain rooms in home.  <b>Weakness:</b> Participants compensated with money

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<p><b>Funding:</b> Nationwide Children's Hospital Foundation's innovative fund &amp; nationwide Mutual Insurance</p> <p><b>Country:</b> USA</p> <p><b>Bias:</b> none reported</p>		<p>-in person focus group offered to P/G who completed the pretest, download and posttest.</p> <p><b>Purpose:</b> Explore themes 1) IP awareness &amp; home safety behaviors 2) make safe happen user experience 3) motivation for taking IP or safety actions &amp; challenges to accomplishing home safety as perceived by parents with children aged 12 and under.</p>						<p>-no control-group -limited generalizability</p> <p><b>Application:</b> Tailored IP education with technology is beneficial for improving parent knowledge and IP safety behaviors.</p>
<p>Silva et al. (2016). The effect of educational intervention regarding the knowledge of mothers on</p>	<p>Behavioral change theory (inferred)</p>	<p><b>Design:</b> Quasi- experimental</p> <p><b>Method:</b> pretest- posttest</p> <p><b>Purpose:</b></p>	<p><b>Sample:</b> N- 155 mothers of children &lt; 5 YoA</p>	<p><b>IV-</b> IP education</p> <p><b>DV-</b> increased IP knowledge</p>	<p>Self-report questionnaire pre- and post-IP education intervention</p>	<p>Comparison of pre- and post- scores.</p> <p>Chi-square test of Pearson at 5% significance</p>	<p>Significant ↑ in drowning IP knowledge (p=0.000)</p> <p>Significant ↑ in fall IP</p>	<p><b>Level III</b></p> <p><b>Strength:</b> Large sample size</p>

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prevention of accidents in childhood.  <b>Funding:</b>  <b>Country:</b> Brazil  <b>Bias:</b> none reported; only mothers		Analyze mothers' knowledge about the prevention of accidents in childhood before and after participating in an educational intervention.	<b>Setting:</b> Basic Unit of Family Health			Linear trend chi-square test Fishers exact test	knowledge (p=0.000)	<b>Weakness:</b> immediate post test -no assessment of behavior Δ  <b>Application:</b> IP education significant for increasing knowledge.
Wang et al. (2018). A randomized safety promotion intervention trial among low-income families with toddlers.  <b>Funding:</b> National institute of Child Health and Human Development & U.S. Department of Agriculture  <b>Country:</b> USA	SCT	<b>Design: RCT</b>  <b>Method:</b> Random assignment into safety promotion intervention 8 session group safety promotion intervention) or two attention control groups with obesity prevention trials with 8 sessions similarly set up.  <b>Purpose:</b> To examine effectiveness of intervention on	N= 277 low-income mother-toddler dyads n=91 IG n=186 CG  Setting: community from a pediatric practice and low-income urban area, intervention at church and a preschool.	IG- injury prevention group education and telephonic sessions with mothers and health educators.  CG- maternal diet/physical activity or toddler feeding behavior. Group and telephonic health education.	Linear mixed models compared change over time  Data collectors with a 9-item checklist of home safety problems at enrollment (baseline), 6 and 12 months after baseline.	Intent to treat analysis & per-protocol analyses conducted and compared.	IG significantly ↓ # of safety problems from baseline (mean 2.36, SD 1.58) to 6-month f/u (1.73, SD 1.55) (p=0.021) and sustained through 12 months (p=0.06)  CG- No Δ in # of problems between baseline, 6 or 12 months.	<b>Level I</b>  <b>Strength:</b> -long duration with eval at 6 and 12 months -objective measures, not parent report. -group and one on one education  <b>Weakness:</b> -Not generalizable. -only mothers  <b>Application:</b> Group education in primary care practices may be

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Citation	Theory/ Conceptual Framework	Design/ Method	Sample/ Setting	Major Variables & Definitions	Measurement/ Instrumentation	Data Analysis	Findings/ Results	Level/ Quality of Evidence; Decision for practice/ application to practice
<b>Bias:</b> none reported; targeted only mothers.		the reduction of home safety problems among low-income families.		DV1- home safety problems				effective means of providing safety information.
Zonfrillo et al. (2018). Outcomes after injury prevention counselling in a paediatric office setting: A 25-year review.  <b>Funding:</b> none reported  <b>Country:</b> USA  <b>Bias:</b> none reported	Donabedian's Model	<b>Design:</b> SR  <b>Purpose:</b> Review evaluations of the effectiveness of office-based paediatric IP counselling research.	N- 16 IP intervention articles  n: 12 RCT n: 3 non-RCT n: 1 pretest-post test	Inclusion criteria: IP for family with child < 5 YoA; Unintentional injury counselling; IP counselling occurred in office setting; outcome assessment, effects summarized.	Google scholar  Descriptive analysis  Quality checklist <b>IV:</b> IP education intervention  <b>DV1:</b> $\Delta$ in IP knowledge or reported behavior $\Delta$  <b>DV2:</b> Observed behavior $\Delta$	Study characteristics  Outcomes  effects	<b>DV1:</b> $\uparrow$ IP knowledge and behavior $\Delta$  <b>DV2:</b> $\uparrow$ observed behavior $\Delta$	<b>Level I</b>  <b>Strength:</b> Large sample size  <b>Weakness:</b> Only one database search  <b>Application:</b> IP education from provider increases P/G IP behavior and knowledge

Key: **AAP**- American Academy of Pediatrics; **AG**- anticipatory guidance; **ANOVA**- analysis of covariance; **b**- birth; **CG**- control group; **CSR**- car seat recommendations; **C**- caregiver; **DV**- dependent variable; **f/u**- follow up; **G**- guardian; **IG**- intervention group; **IP**- injury prevention; **IV**- independent variable; **M**- measure; **N**- number of studies; **n**- number of participants; **P**- parent; **p**- picture; **PDSA**- plan, do, study act; **QI**- quality improvement; **RBDS**- risk behavior diagnosis scale; **RCT**- randomized control trial; **SCT**- Social Cognitive Theory; **SD**- standard deviation; **SR**- systematic review; **ST**- screening tool; **T**- text; **t**- teen; **WCV**- well visit; **YoA**- year(s) of age;  $\Delta$ - change;  $\uparrow$ - increase

Table A2

## Synthesis Table

Author	England Will et al.	Gittelman et al.	Gittelman et al.	Habermehl et al.	Johnson et al.	McCallin et al.	Roberts et al.	Silva et al.	Wang et al.	Zonfrillo et al.
Year	2015	2018	2015	2019	2015	2020	2019	2016	2018	2018
Design	RCT	PS	CS	QES	SR	CS	QES	QES	RCT	SR
LOE	I	II	IV	III	I	IV	III	III	I	I
N=	300 C	7 S	6 S	200	67	3 S	40 C	155 C	277 C	16
n=	--	39 P	--	--	--	42 P	--	--	91 IG	--
n=	--	386 F	--	--	--	--	--	--	186 CG	--
target	C	P	P	C	P	P	C	C	C	C
Ages	<12 y	0-1 y	0-1 y	1-4 y	--	0-10 y	0-12 y	0-5 y	12-32 m	0-5 y
Setting	clinic	clinic	clinic	clinic	--	clinic	community	clinic	community	clinic
<b>Interventions</b>	IP EF NP	PE IP AG P	PE audit	IP AG NP	EF	PE IP AG P	MA NP	IP E NP	Group & 1on 1 IP E NP	IP AG P
PE	--	X	X	--	X	X	--	--	X	--
ST	--	X	X	--	--	--	--	--	--	--
IP AG/E	X	--	--	X	--	X	X	X	X	X
EM	X	--	--	X	--	X	X	--	X	X
<b>Outcomes</b>										
Quality*	--	↑	↑	--	↑	↑	--	--	--	--
Knowledge**	↑	--	--	↑	--	↑	↑	↑	--	↑
Behavior***	↑	↑	↑	↑	--	↑	↑	--	↑	↑
<b>Instruments</b>	Pre & Post survey	Pre & post survey	Chart audit	Immediate Post survey & 2 wks later	Coded results	Pre & post survey/ tests	Pre & post tests	Pre & post tests	Pre and post home analysis	Pre and post test Post behavior analysis

Key: **AG**- anticipatory guidance; **C**- caregiver; **CG**- control group; **CS**- cohort study; **E**- education; **EF**- emphasis framing; **EM**- education materials; **F**- families; **IG**- intervention group; **IP**- injury prevention; **LOE**- level of evidence; **m**- month(s) **MA**- mobile application; **N**- number of subjects; **NP**- non-provider **P**- providers; **PE**- provider education; **PS**- prospective study; **QES**- quasi-experimental study; **S**- sites; **ST**- screening tool; **y**- year(s); ↑- increase

Quality\*- amount or frequency of injury prevention anticipatory guidance from provider, or positive change in practice.

Knowledge\*\*-provider or caregiver injury prevention knowledge

Behavior\*\*\* - caregiver safety or injury prevention behavior change, intent or actual

## Appendix B

## Models and Frameworks

Figure 1B

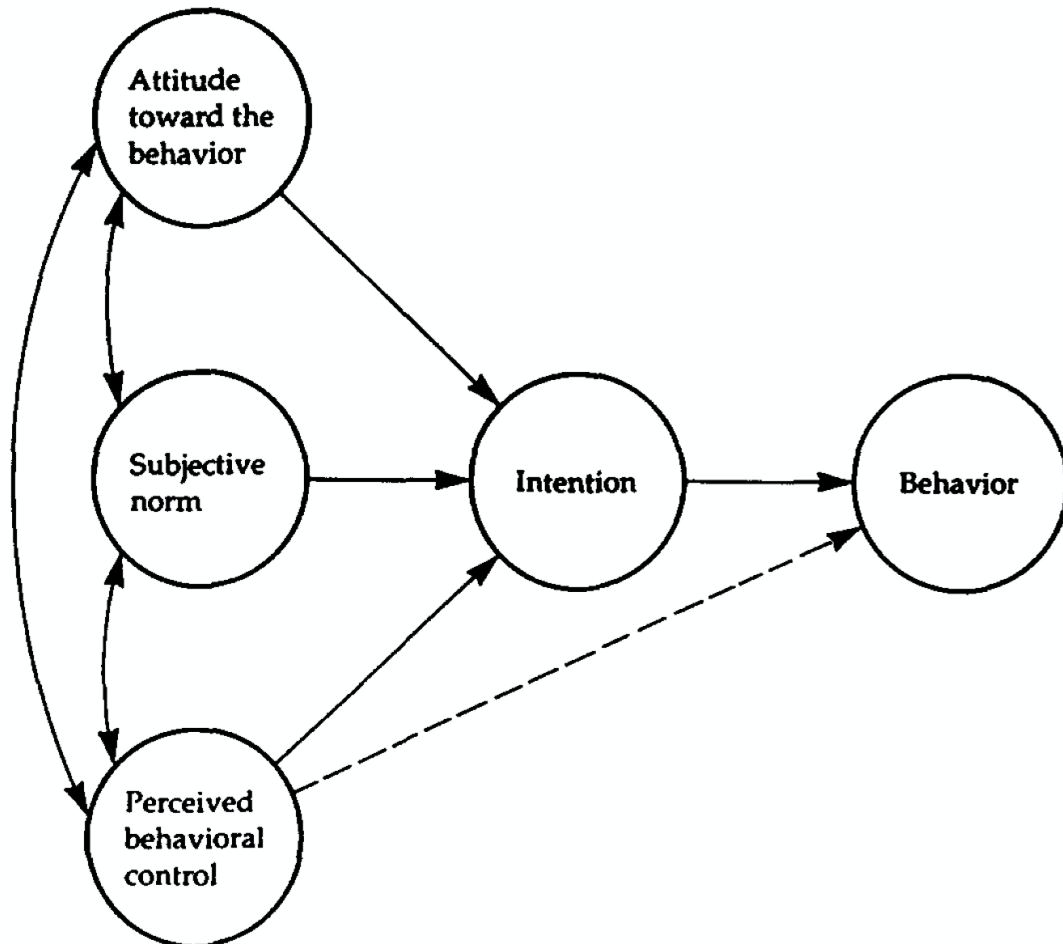
*The Theory of Planned Behavior*

FIG. 1. Theory of planned behavior.

Ajzen (1991).

Figure 2B

Stetler Model

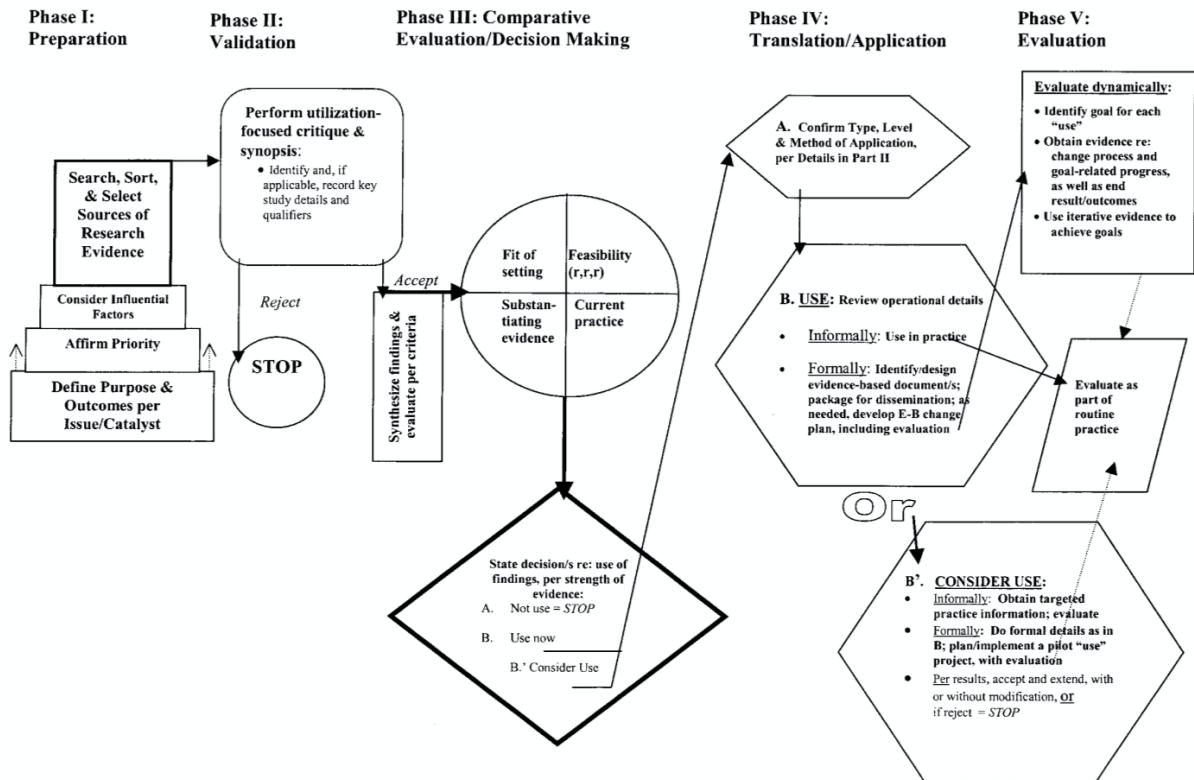


Figure 3A. Stetler Model, Part I: Steps of research utilization to facilitate EBP

Stetler, (2001, p. 276).

## Appendix C

## Internal Review Board Approval



APPROVAL: EXPEDITED REVIEW

[Diana Bowman](#)

LAW: Law, Sandra Day O'Connor College of -  
[Diana.Bowman@asu.edu](mailto:Diana.Bowman@asu.edu)

Dear [Diana Bowman](#):

On 12/17/2019 the ASU IRB reviewed the following protocol:

Type of Review: Initial Study	
Title: Drowning Prevention for Well Child Visits in the First to Fourth Year of Life	
Investigator: <a href="#">Diana Bowman</a>	
IRB ID: STUDY00011141	
Category of review:	
Funding: None	
Grant Title: None	
Grant ID: None	
Documents Reviewed:	<ul style="list-style-type: none"> <li>• Bowman, Consent Form for Caregiver Participation.pdf, Category: Consent Form;</li> <li>• Bowman, Template-short-consent [for Providers].pdf, Category: Consent Form;</li> <li>• Caregiver Follow Up Survey.pdf, Category: Measures (Survey questions/Interview questions /interview guides/focus group questions);</li> <li>• Educational Materials - Poster with Tips.pdf, Category: Participant materials (specific directions for them);</li> <li>• Educational Materials - Sunblock proof (protocol appendix 5c).pdf, Category: Participant materials (specific directions for them);</li> <li>• Educational Materials - Water safety handout (protocol appendix 5b) cop.pdf, Category: Participant materials (specific directions for them);</li> <li>• Form-Social-Behavioral-Protocol [Bowman et al, Water Module][v3].docx, Category: IRB Protocol;</li> </ul>
	<ul style="list-style-type: none"> <li>• Outcome_Letter [APPROVAL from PCH].pdf, Category: Off-site authorizations (school permission, other IRB approvals, Tribal permission etc);</li> <li>• PCCN EHR Module Content.pdf, Category: Participant materials (specific directions for them);</li> </ul>

	<ul style="list-style-type: none"> <li>• Post-Curriculum Web-Based Survey.pdf, Category: Measures (Survey questions/Interview questions /interview guides/focus group questions);</li> <li>• Pre-Curriculum Web-Based Survey.pdf, Category: Measures (Survey questions/Interview questions /interview guides/focus group questions);</li> <li>• Provider curriculum .pdf, Category: Technical materials/diagrams;</li> <li>• Recruiting flyer (PCPs) .pdf, Category: Recruitment Materials;</li> <li>• Screen Shot 2019-12-03 at 11.13.08 AM.png, Category: IRB Protocol;</li> <li>• Touchstone Web-Based Survey.pdf, Category: Measures (Survey questions/Interview questions /interview guides/focus group questions);</li> </ul>
--	---

The IRB approved the protocol from 12/17/2019 to 12/16/2020 inclusive. Three weeks before 12/16/2020 you are to submit a completed Continuing Review application and required attachments to request continuing approval or closure.

If continuing review approval is not granted before the expiration date of 12/16/2020 approval of this protocol expires on that date. When consent is appropriate, you must use final, watermarked versions available under the “Documents” tab in ERA-IRB.

In conducting this protocol you are required to follow the requirements listed in the INVESTIGATOR MANUAL (HRP-103).

Sincerely,

IRB Administrator

cc:

Jessica Wani

## Appendix D

### Provider Curriculum

#### *Drowning Prevention Provider Curriculum*

1. Problem
  - a. Drowning leading cause of death in children 1 to 4 years of age in US
  - b. Arizona's drowning rate is nearly double the national average
  - c. Primary care providers are important source of information
    - i. Time constraints limit patient time & make literature reviews challenging
2. New American Academy of Pediatric policy statement
  - a. Know leading cause of drowning
  - b. Provide targeted measures
  - c. Partner with public health in evidence-based interventions
3. Water Safety Project
  - a. Continuous quality improvement project
  - b. 2018 pilot study
  - c. Facilitated by partnership
  - d. Efficient
  - e. Significant
4. Project Goals
  - a. Measure and improve provider drowning prevention effort & knowledge
  - b. Dovetail with developmental milestones during well visits for ages 1-4 years.
    - i. Increase provider knowledge
    - ii. Empower increased provider educational effort
    - iii. Increase caregiver awareness of drowning risk & knowledge of safety strategies
  - c. Share drowning prevention messages and resources
  - d. Demonstrate integration
  - e. Use provider feedback to improve & expand process improvement
5. Project Resources
  - a. Support system
    - i. Local champion
    - ii. Expert guidance
    - iii. Student involvement for random parent surveys by phone
  - b. Handouts
    - i. Drowning prevention information
    - ii. Local resources
  - c. Sunscreen with safety messages
  - d. Posters
6. Your Role in this Project
  - a. Select a 4-digit identifier that you will remember (not SS number, birthday, or phone #). Please use one letter.
  - b. Document water safety discussion during well visits if this occurred
  - c. Document the water safety handout has been given to the family.



- d. Complete pre, post & touchstone surveys using your 4 digit identifier
- e. Timeline: TBD
- 7. Consent and assessment completed
- 8. Drowning data
  - a. US rate: 2.87; AZ rate 5.39
- 9. Milestones Matter
  - a. Developmental norms may explain drowning risk in this age group
  - b. Toddlers (children 1-4 years):
    - i. Move quickly
    - ii. Are very active-running, climbing, hiding
    - iii. Become cranky & have temper tantrums
    - iv. May not understand the difference between pretend & real
    - v. Break rules & may go to pool alone
- 10. Caregiver Strategy
  - a. A safety plan at the pool is important
  - b. Toddlers don't stop – parents need to focus & avoid getting too stressed out
  - c. Don't go to the pool if tired or stressed
- 11. Supervision
  - a. Constant, capable supervision is the only way to ensure a child's safety around water.
    - i. Designate an adult supervisor
    - ii. Keep your child within "touch" distance
    - iii. Supervisor must be able to swim
    - iv. Ensure child's face is always visible
    - v. Turn off your cell phone
    - vi. Limit alcohol
    - vii. Take turns every 15 minutes
- 12. Swim Lessons
  - a. Children do not have instinctive swim skills
    - i. Caregivers think they do
  - b. Children may forget skills learned in swimming lessons
    - i. Caregivers think they won't
  - c. Regardless of swimming ability, children need to be supervised at all times
- 13. AAP now advises:
  - a. No benefit for swim lessons for children less than one year
  - b. Swimming is a "protracted process"
  - c. Demonstration of skills in one environment may not apply in another
- 14. Devices & Emergencies
  - a. Caregivers may not understand that drownings happen during non-swim times
    - i. A working fence is critical
  - b. Floaties & "puddle jumpers" (cushioned arm floats that connect) are toys & don't prevent drowning
  - c. US Coast Guard approved life jackets that look like a vest should be used in the pool area
  - d. Adults need to keep CPR skills current
- 15. Materials & Metrics

- a. Macros
  - b. Posters
  - c. Handouts
  - d. Random parent surveys by phone
  - e. Touchstone luncheons
16. Assessment & Next Steps
- a. Today: complete post-assessment
  - b. Next days: Share messaging & handouts, use posters
  - c. At touchstone luncheon: complete survey, share feedback
17. Questions

## Appendix E

## Questionnaires

## Figure E1

*Provider pre-evaluation***Provider pre-evaluation**

Please select a four digit identifier that you will remember. Do not choose a social security number, birthday, or phone number. Please use one letter.

\_\_\_\_\_

How often do you provide water safety education during your well visits for children ages 1 to 4 years?

- Never  
 Rarely  
 Sometimes  
 Often  
 Always

What barriers keep you from discussing water safety?

- Time constraints  
 Other subjects are higher priority  
 Discomfort due to limited knowledge  
 Parents are not willing to discuss  
 Other

What other barriers keep you from discussing water safety?

\_\_\_\_\_

Do you discuss a connection between developmental milestones in this age group (i.e. active, curious) and drowning risk?

- Never  
 Rarely  
 Sometimes  
 Often  
 Always

If you educate caregivers of children ages 1 - 4 years about supervision at a swimming pool, please indicate which messages you routinely discuss. (Mark all that apply.)

- This is not a subject I routinely discuss  
 Designate which adult is supervising a child  
 Choose a supervisor who is capable (adult, able to swim, minimal alcohol consumption, cell phone turned off)  
 Ensure supervisor is within arm's reach of a child & able to see the child's face  
 After a brief turn, rotate the supervisor

Please indicate which additional topics you routinely discuss with caregivers of children 1 - 4 years of age. (Mark all that apply.)

- Do not go to the pool with children when stressed or tired  
 Keep CPR skills current  
 Ensure children wear a properly-fitted US Coast Guard approved life jacket, which looks like a vest, near a pool  
 Keep a working fence in place to protect children during non-swim times  
 Understand that swim skills in this age group are limited & unreliable  
 Other

What other water safety topics do you routinely discuss with caregivers of children 1 - 4 years of age?

\_\_\_\_\_

What is your clinical role?

- MD  
 PA  
 NP  
 DO

How many years have you been practicing?

- 0 - 5  
 6 - 10  
 11 - 15  
 15 - 20  
 >21

**Figure E2***Provider Post-evaluation***Provider post-evaluation**

Page 1

Please select a four digit identifier that you will remember. Do not choose a social security number, birthday, or phone number. Please use one letter.

\_\_\_\_\_

How often will you provide water safety education during your well visits for children ages 1 to 4 years?

- Never  
 Rarely  
 Sometimes  
 Often  
 Always

What barriers do you think will keep you from discussing water safety?

- Time constraints  
 Other subjects are higher priority  
 Discomfort due to limited knowledge  
 Parents are not willing to discuss  
 Other

What other barriers do you think will keep you from discussing water safety?

\_\_\_\_\_

Do you plan to discuss a connection between developmental milestones in this age group (i.e. active, curious) and drowning risk?

- Never  
 Rarely  
 Sometimes  
 Often  
 Always

If you educate caregivers of children ages 1 - 4 years about supervision at a swimming pool, please indicate which messages you will discuss. (Mark all that apply.)

- This is not a subject I will routinely discuss  
 Designate which adult is supervising a child  
 Choose a supervisor who is capable (adult, able to swim, minimal alcohol consumption, cell phone turned off)  
 Ensure supervisor is within arm's reach of a child & able to see the child's face  
 After a brief turn, rotate the supervisor

Please indicate which additional topics you will discuss with caregivers of children 1 - 4 years of age. (Mark all that apply.)

- Do not go to the pool with children when stressed or tired  
 Keep CPR skills current  
 Ensure children wear a properly-fitted US Coast Guard approved life jacket, which looks like a vest, near a pool  
 Keep a working fence in place to protect children during non-swim times  
 Understand that swim skills in this age group are limited & unreliable  
 Other

What other water safety topics do you routinely discuss with caregivers of children 1 - 4 years of age?

\_\_\_\_\_

What is your clinical role?

- MD  
 PA  
 NP  
 DO

How many years have you been practicing?

- 0 - 5  
 6 - 10  
 11 - 15  
 15 - 20  
 >21

## Figure E3

*Provider Touchstone***Provider touchstone**

Please select a four digit identifier that you will remember. Do not choose a social security number, birthday, or phone number. Please use one letter.

\_\_\_\_\_

How often have you provided water safety education during your well visits for children ages 1 to 4 years?

- Never  
 Rarely  
 Sometimes  
 Often  
 Always

What barriers kept you from discussing water safety?

- Time constraints  
 Other subjects are higher priority  
 Discomfort due to limited knowledge  
 Parents are not willing to discuss  
 Other

What other barriers kept you from discussing water safety?

\_\_\_\_\_

How do you think these barriers can be addressed?

\_\_\_\_\_

How often have you discussed a connection between developmental milestones in this age group (i.e. active, curious) and drowning risk?

- Never  
 Rarely  
 Sometimes  
 Often  
 Always

If you educated caregivers of children ages 1 - 4 years about supervision at a swimming pool, please indicate which messages you discussed. (Mark all that apply.)

- This is not a subject I routinely discussed  
 Designate which adult is supervising a child  
 Choose a supervisor who is capable (adult, able to swim, minimal alcohol consumption, cell phone turned off)  
 Ensure supervisor is within arm's reach of a child & able to see the child's face  
 After a brief turn, rotate the supervisor

Please indicate which additional topics you discussed with caregivers of children 1 - 4 years of age. (Mark all that apply.)

- Do not go to the pool with children when stressed or tired  
 Keep CPR skills current  
 Ensure children wear a properly-fitted US Coast Guard approved life jacket, which looks like a vest, near a pool  
 Keep a working fence in place to protect children during non-swim times  
 Understand that swim skills in this age group are limited & unreliable  
 Other

What other water safety topics did you routinely discuss with caregivers of children 1 - 4 years of age?

\_\_\_\_\_

Do you believe this program increases caregiver knowledge about child drowning risk & safety strategies?

- Very ineffective at increasing knowledge  
 Not effective at increasing knowledge  
 Neutral  
 Effective at increasing knowledge  
 Very effective at increasing knowledge

Would you recommend this program for other primary care offices?

- Definitely would not recommend  
 Probably would not recommend  
 Not sure  
 Probably would recommend  
 Definitely would recommend

What is your clinical role?

- MD  
 PA  
 NP  
 DO

How many years have you been practicing?

- 0 - 5  
 6 - 10  
 11 - 15  
 15 - 20  
 >21

**Figure E4***Caregiver Follow-up Survey***Caregiver follow up survey**


---

Record ID \_\_\_\_\_

---

Did you talk about water safety with your healthcare provider at your last well visit?  Yes  
 No  
 I do not remember

---

When did the provider share water safety information with you?  During our review of child development "milestones" (norms for each age)  
 During general discussion  
 I do not remember

---

What did your provider share with you? (Check all that apply.)  Supervision: Designate  
 Supervision: Choose an adult  
 Supervision: Choose a person who can swim  
 Supervision: Constant  
 Supervision: Rotate  
 Keep child within arm's reach at all times  
 CPR skills  
 Life jackets  
 Turn off cell phone at the pool  
 Avoid pool with children when stressed or tired  
 Other

---

What other information did your provider share? \_\_\_\_\_

---

Did the provider talk about or share any water safety resources with you during your well visit?  Yes  
 No  
 I don't remember

---

Which resources did the provider talk about or share? (Choose all that apply.)  "At the Pool" parent handout with palm tree on cover (ages 1, 2, 3, 4)  
 Sunscreen packet  
 We talked about the information on the poster in the patient room  
 Other

---

What other resources did the provider share? \_\_\_\_\_

---

Did your last well visit help you to understand how to protect your child from drowning?  Definitely did not help me understand how to protect my child  
 Probably did not help me understand how to protect my child  
 Unsure if it helped me understand how to protect my child  
 Probably helped me understand how to protect my child  
 Definitely helped me understand how to protect my child

---

Are you interested in attending a "Playing it Safe" water safety workshop offered by Phoenix Children's Hospital?  Yes  
 No  
 Unsure, tell me more

---

Do you think this program to share water safety information with caregivers helps to reduce drowning risk?  Definitely not helpful to reduce drowning risk  
 Probably not helpful to reduce drowning risk  
 Unsure if helpful to reduce drowning risk  
 Probably helpful to reduce drowning risk  
 Definitely helpful to reduce drowning risk

---

Other parent comments \_\_\_\_\_

## Appendix F

## Budget

Phase	Activities	Cost	Total	Note/Justification
<b>Preparation</b>	Design and print posters and parent education handouts.	\$1000		In kind support from partnered hospital
	Promotion materials	\$1000		Direct: water safety message sunscreen bottles for caregivers
	Hire Spanish translator Estimated 15 hours @ \$15/hr to translate materials	\$225	\$2225	In kind support Spanish translators already on partner staff.
<b>Delivery</b>	Catered food for lunch and learn and follow up touchstone sessions. Estimated \$15/attendee x 60	\$900		Direct cost
	Office space for lunch and learn sessions. \$50x4	\$200		Indirect- Office space in pediatric clinics
	Provider time (Indirect) estimate \$300/hr/provider but over lunch hour so no loss of patient appointments or revenue. Estimate \$100/hr/provider time x 2 sessions	\$6000	\$7100	Indirect but offered during lunch, so no loss patient appointments.
<b>Evaluation</b>	Redcap subscription	\$0 for non-profit organizations		Account owned by partnered hospital.
			<b>\$9325</b>	

## Appendix G

### Results

**Table G1**

*Two tailed Wilcoxon sign paired test*

	Pre – post comparison: Intention		Pre – TS comparison: Change	
	M	p	M	p
How often do you provide water safety education during your well child visits for children ages 1 to 4 years?	4.46	= 0.027	4	< 0.001
Do you discuss a connection between developmental milestones in this age group (i.e. active, curious) and drowning risk?	4.26	< 0.001	3.38	= 0.016



**Figure G1**

*Change Water Safety Message Delivery*

