Introduction
Developmental and behavioral problems are estimated to be present in 12-16% of children living in the United States with less than 2% of children younger than 24 months receiving early intervention therapy\(^1\). This supports the need for an objective screening tool in pediatric practice. Per the AAP guidelines, developmental surveillance should be done at every well child visit with screening tests administered at 9, 18 and 30 months\(^2\). If during well child exams there is a demonstrated risk for delay then a screening tool should be conducted. The *Ages and Stages Questionnaires-Third Edition* (ASQ-3) meets criteria for a first-level comprehensive screening and monitoring program. An example of the screen is shown in Picture 1 and the screening sheet is seen in Picture 2 below. Research for the ASQ-3 began in 1980 when it was called the *Infant/Child Monitoring Questionnaire*. The ASQ-3 was found to have high inter-observer reliability with 93% agreement found between parents and trained examiners\(^3\). A study published in 2007 investigated the incorporation of the ASQ screening tool at a large pediatric clinic in the Pacific Northwest for ages 12 and 24 months. Results included 3.4% of parents asking for help to complete the screening tool demonstrating it’s easy to understand format. They also found a 224% increase in referrals to early intervention, especially at the 12 month visit. It was important to note that of the 82 that were found eligible for these services, 37 of them would have been missed without the ASQ\(^1\). In another study published in 2012 a smaller population in Chile was screened with the ASQ-3 and Bayley-III, another developmental screening tool. This was done at 8, 18 and 30 months. They found the ASQ-3 identified more children with developmental delays than the Bayley-III for those children with biological risk factors such as prematurity\(^2\). Overall, the literature supports using the ASQ-3 as a high sensitivity screening tool for developmental delays. Children with risk factors like prematurity are often already enrolled in the South Carolina’s Baby Net program, which provides early intervention services including speech, occupational and physical therapy for those less than 3 years of age. However, those children with subtle delays and no risk factors are more often missed for early intervention services.

The Children’s Outpatient Clinic (CHOC) at Palmetto Health Richland promotes developmental screening at every well child visit. They already employ the M-CHAT as a standardized screening tool for autism spectrum disorders at the 18 month and 2 year well visits, however there are no other formal developmental screening tools utilized currently. Our aim for this quality improvement project is to successfully implement the ASQ-3 as a way to screen for developmental delays in social, fine motor, gross motor and communication skills at the recommended well child visits for children ages 9 and 18 months within seven months of its initiation. This endeavor will be measured by having 90% of those 9 and 18 month well child patients screened, documentation rate with a goal of 90% compliance and referral rate of 100% of those children who fail screening. The overall goal for this project is to remain adherent to the AAP recommendations as stated above and to better serve our patient population by successfully referring children with delays sooner to early intervention services.
Methods
The first step was obtaining the funding and purchasing of the ASQ-3 program, which was successfully completed by the CHOC nurse manager, Sara Starnes and Clinic Director, Dr. Kathryn Stephenson. We then held meetings between myself, the nurse manager and clinic director to discuss how to best implement the ASQ-3 screening tools at the 9 month and 18 month well child visits. Each PDSA cycle lasted approximately a month and the major cycles are depicted in Figure 1. We started implementation with a trial run to get a better idea of how our clinic could best initiate the ASQ-3 for our patient population. The trial was conducted by myself on 9 month, 18 month and 36 month old well child visits (PDSA 1). We then extended the trial to the other pediatric residents rotating in clinic that month to gain more information on the best way to fully implement the ASQ-3 and document it in the electronic medical record (PDSA 2). At this point the residents were giving the forms to the parent’s in the clinic room. Many of the parent’s felt it would be better to receive the screens in the waiting room prior to them being taken back. We also found that discussing any section where the child was in the grey zone or below the cut off should be done with the parent prior to them leaving as there was often a misunderstanding involved with the wording of the question. With these findings the next step was to involve the clinic staff and have the front desk distribute the screens to the parents on arrival, so that they may be completed in the waiting room (PDSA 3). This also required our clinic to better document the reason for each well child visit, so this could be seen by the front desk and an ASQ-3 would be given on arrival to their appointment. Within this cycle period a presentation was given to the pediatric residents on how to successfully conduct and interpret an ASQ screening. Also, documenting the ASQ-3 in the electronic medical record (EMR) was explained. The screens were collected monthly for measuring outcomes and a spreadsheet was produced to track progress as depicted in Figure 2. It was then discovered that many still did not know where to document the screen, so a sign with instructions was displayed in the clinic (PDSA 4). There still appeared to be residents who were unaware of the new screening tool being utilized, so a reminder email was then sent with all the information prior to each rotation to the new residents coming on service (PDSA 5). There was an increase in screening, but there were screens without names present, so the reminder email then included instructions to place patient sticker on the screen (PDSA 6).
Results

Data was collected for a 7 month study period. The first month was a trial run and not included in the data results. The data range is from October 2014 through March 2015. The first outcome measure was to screen 90% of patients presenting for their 9 month and 18 month well child visits. The percentages were determined by the number of screens collected per month divided by the number of patients that month with an appointment scheduled as a 9 or 18 month well child check. Figure 3 below shows the data collection for this outcome measure. Also, included in Figure 3 are the approximate times for PDSA cycles to better illustrate when changes were made in response to varying rates of screening.
The second outcome measure involved documentation of the ASQ-3 in the EMR. We had a goal of documenting 90% of those screened at their 9 month and 18 month well child visit. Figure 4 demonstrates the monthly trend of documentation rates. The initial three months of the project have a small number being screened and the group of residents performing screens was controlled, so everyone was successfully documenting results. As the total number of those being screened went up the documentation rates went down and this can be attributed to the increased resident involvement and higher chance for missed documentation.

The last outcome measure was to have 100% of those screening below the cut-offs receive referrals to early intervention services. Out of those screened who were found to need referrals for early intervention (16 patients), half were given proper referrals and the other half were considered “missed referrals.” This is seen in Figure 5 below.
Overall, the results for each outcome measure were calculated. As seen in Figure 6, the goal was met for only the second outcome measure involving proper documentation of those screened. The first outcome measure was to screen 90% of those 9 month and 18 month well child visits and only 60% were found to have been screened in the 7 month period. The ultimate goal and purpose for screening is to make referrals to early intervention services and our goal was to refer 100% of those children screening below the cut-offs, however this was not met and the referral rate was 50% of those needing referrals. This number does not include those that were not screened since there is no way to know if those children would have needed early intervention services, therefore the missed referral rate could in reality be higher.

**Discussion**

Having a successful developmental screening tool for well child visits is critical to any pediatric practice in order to make necessary referrals early on in a child’s development. Studies have shown that earlier intervention at a younger age can have greater long term outcomes on development and in South Carolina making referrals for patients younger than 3 years of age is crucial since below 3 years they can take advantage of BabyNet services. There were obstacles in implementing the ASQ-3 in CHOC including monthly turn-around of residents, off service residents rotating through our clinic, medical students unaware of how to document properly and turnover of front desk clinic staff. Ultimately, slow...
implementation and consistent reminders to the various team members involved made the project successful.

Our first outcome measure involving the rate of screening had potential for error with the distribution of the screen. In order for the front desk to know who needs an ASQ-3, the reason for their visit must be seen easily on the scheduling screen of the EMR. This took a few weeks to get started and continues to be a source of error for data collection because those without a reason documented for their well child visit cannot be accounted for in the data collection and the secretary will have no other method of knowing which patient needs screening. Also, having available copies for the front desk was difficult in the first few months of implementation. The nurse manager was made aware of this and helped to maintain copies and created a designated area for them that was easily accessible to the secretary. There also were 10 missed charts due to lack of patient identification on the screening sheets. This was noticed about 3 months into the project and was remedied with a reminder sent via email to all residents asking them to place a patient sticker on the screen before turning it in.

Another source for difficulty in gaining a successful second and third outcome measures included getting information to all the residents and medical students involved in documentation and on how to make proper referrals. The major goal of this QI project was to have residents aware of the screen, how to score it and then document in the EMR. The rate for documentation did increase following posting of written instructions on how to document the screen in clinic and a reminder email being sent the week prior to the new group of residents coming onto clinic service. After four months of this email it was no longer necessary to send to pediatric residents since they were sufficiently aware at that point of the ASQ-3, however family medicine residents are still often unaware of our clinic screens and there currently lacks an efficient way to educate them. ASQ-3 instructions were added to a “clinic reminder sheet” hanging up in the resident room, but this will need to be addressed in future as it is a weakness in the overall implementation of our screening tools.

The referral portion is the next big step in the continuation of this QI project. There were referrals that needed to be made that were documented in the chart as, “to be followed up with at the next well child visit.” However, since we are only screening at the 9 and 18 month visits without any objective method for screening in between, we should be making referrals for any child who screens below the cut off. Then we should allow the therapist, or proper referral site, to determine if their services would be beneficial. Also, a score in the “grey zone” of an ASQ-3 score sheet requires learning activities to be provided to the parents to work on at home. A future step is to obtain copies of these learning activities provided by the ASQ-3 distributors to provide to our parents.

Overall, the ASQ-3 was successful in one of three outcome measures determined to help gauge the project’s success prior to its initiation at CHOC. The screening rate reached 60%, documentation rates were 90%, and referral rates were 50%. Work remains in educating all residents who work in CHOC on how to properly utilize the ASQ-3 and make appropriate referrals. Reminder emails and presentations at CHOC QI meetings will need to be done for new interns this coming year if the ASQ-3 is to be continued successfully in CHOC.
References

