Implementation of a Hip Surveillance Care Algorithm for Cerebral Palsy: A Quality Improvement Project

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Abstract

Background: Hip displacement is a major cause of morbidity, disability, and pain for children with cerebral palsy (CP). A key indicator of this complication is the detection of migration percentage (MP) of the hip x-ray. The purpose of this project was to improve ordering and interpretation of hip x-rays to ensure appropriate surveillance management and to reduce the number of hip surgeries.

Methods: Providers in the CP clinic developed a care algorithm for hip surveillance, built consensus to adopt the algorithm, and implemented it. After initial implementation, strategies were developed to improve adherence to the algorithm. Outcomes were assessed prior to implementation (FY2015), for the first few months of use (February-May 2016), and several months after initiation (July-September 2016). Clinical data were analyzed to determine patients for whom indicated hip x-rays were obtained and hip x-ray management plans were followed. Improvement in the percentage of patients for whom indicated hip x-rays were obtained and perfect management (all steps met) improved from less than 25% to 50%. Near complete fidelity to the algorithm occurred in the later steps wherein virtually all obtained x-rays were recorded, x-ray management plans were recorded, and appropriate management plans were recorded and appropriate management initiated. The most impactful inflection point was the step to record the x-ray and management plan, and adherence of the management plan to the care algorithm at each time interval.

Results: Development of a care algorithm was straightforward, as was obtaining consensus about its use. Initial implementation showed that fewer than half of indicated x-rays were being ordered; moreover, merely 17% obtained the hip x-ray and had MP recorded. After implementation of the care algorithm, which included a new system for radiologists to calculate and record MP, 86% of indicated x-rays were ordered and 51% obtained the x-rays and 47% had MP reported. Following a period of additional provider education and sharing of results, adherence to the care algorithm improved to 74% of indicated x-rays being ordered and 53% obtaining the x-ray as well as 53% with MP reported. Although prior to implementation fewer than half of obtained x-rays had recorded MP and management plans were provided just over half of the time, after implementation these practices changed dramatically. The greatest fidelity to the algorithm occurred when x-rays were obtained because almost all patients who did not get their x-rays had appropriate interpretation, data recording, and management thereafter. After initial implementation, 78% of obtained x-rays had recorded MP and management plans which were consistent with the care algorithm. This number improved further to 94% in the follow-up evaluation periods.

Conclusion: Implementation of a care algorithm for hip surveillance in CP resulted in significant improvements in ordering, interpreting, and managing x-rays. Changing radiologists' patterns for reporting resulted in almost total compliance with x-ray interpretation and management plans. Future work will focus on ensuring x-rays are ordered and that families obtain the x-rays as there is high fidelity to the algorithm for all steps after x-rays are obtained.

Background

Hip subluxation/dislocation is a major cause of morbidity, disability, and pain for children with cerebral palsy (CP). A developing body of evidence suggests that early identification of migration, combined with timely observation can delay or prevent progression to dislocation. When this project began, there was moderate to great variation amongst providers in when hip x-rays were obtained, what type and number of images were obtained, whether specific migration percentages were calculated and/or recorded, and when referrals for surgical evaluation were made. As part of our quality improvement process, we sought to develop and implement an algorithm to standardize the decisions and schedules for hip surveillance in children with CP. With a standardized approach to hip surveillance, we hoped to reduce the future number of hip dislocations and the need for salvage surgeries in this population.

Methods

Consensus Development and Education

The algorithm was developed by pediatric physical therapists who direct the CP clinic and the director of orthopedic surgery utilizing available evidence and knowledge of local practice patterns. The proposed algorithm was presented to all physicians in Pediatric Rehabilitation Medicine in written and oral format. Follow-up education was solicited via email and in person. 100% of providers agreed with the algorithm. Copies of the algorithm were made available on shared drives as well as posted in many clinic settings. Providers were reminded about the algorithm by nursing team members and received feedback on their individual performance on the metrics at baseline (prior to algorithm implementation) and again after the initial few months of use.

Tracking of Implementation

Pediatric patients with CP were identified at the time of a clinic visit by nursing staff and confirmed by the treating physician. All patients who were seen and met criteria for hip surveillance were entered into a list for monitoring.

Results

Development of a simple hip surveillance algorithm was accomplished in a matter of days through collaboration with an orthopedic surgeon and consensus was achieved within the full practice after presentation at faculty meetings and over a period of 1 month. Key factors to facilitate implementation and use included developing a specific order for radiology that would trigger an appropriate study with radiologist interpretation with a calculated migration percentage. All baseline, a small minority of patients were receiving appropriate hip surveillance and we had great variation in practice (Figure 2). Once the care algorithm was implemented, improvement was demonstrated in the percentage of patients receiving indicated care at each step of the process and further improvements were achieved in subsequent months (Figure 3).

Lessons Learned

People want to make a difference – when you share information about hip subluxation and dislocation, our providers and support staff were eager to participate. Keep it simple – our algorithm is not complicated, but it has made a huge difference in the number of children getting appropriate surveillance. If we had had to do it harder to know what to do, it might not have had such good uptake.

Acknowledgments

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Reference

1. Smith E, et al. Development of a hip surveillance care algorithm was possible and fruitful for our pediatric rehabilitation medicine division. Partnering with other providers facilitated this success. Having agreed on orthopedic surgery about management helped garner consensus with other providers while facilitating a new workflow in radiology resulted in excellent adherence to the algorithm. We demonstrated sizable increases in the percentage of patients who received hip surveillance and appropriate management.

Current efforts are directed to improving the percentage of ordered x-rays that are obtained within 2 weeks. We are working on improving instructions for families, exploring options for getting x-rays prior to visits, and reminding families when x-rays have not been obtained on the day of visit.

We intend to review the Cerebral Palsy Hip Surveillance Algorithm following the upcoming publication of a new hip surveillance care pathway developed by a committee of international experts in conjunction with the American Academy for Cerebral Palsy and Developmental Medicine. We anticipate making changes to the algorithm and ongoing efforts to measure our performance.