Acceptability and Practicality of Musculoskeletal Examination in Acute General Pediatric Assessment

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Objective To evaluate the practicality and the acceptability of pGALS (pediatric Gait, Arms, Legs and Spine) screening, a simple pediatric musculoskeletal screening examination, when performed as part of an acute pediatric assessment.

Study design Consecutive school-aged children attending an acute pediatric assessment unit were assessed with the addition of pGALS to the routine clinical examination. Practicality (ie, time taken, degree of completion) and patients/parent-assessed acceptability (ie, time taken, discomfort caused) were recorded.

Results Fifty consecutive school-aged children (median age 8 years) were evaluated by pGALS. Median time taken was 3 minutes (range 1.2-5.3), and examination was completed in 47/50 (96%) children. Acceptability of pGALS was deemed high: time taken was "about right" (98% children, 94% parents) and caused no or little discomfort (72% of children, 92% of parents). Abnormalities on pGALS examination were common, with most (17/50, 34%) explained by confirmed musculoskeletal disease, and 6 of 50 (12%) had non- musculoskeletal disease.

Conclusions PGALS is practical and acceptable to perform in acute pediatric assessment performed by a non expert in musculoskeletal medicine. Abnormal musculoskeletal findings are common as part of the pGALS examination but need to be interpreted in the global clinical context and assessment. *(J Pediatr 2010;156:657-62)*.

Musculoskeletal presentations in children and adolescents are common (4% to 30% of individuals[1-4]), with a prevalence greater than epilepsy or diabetes, but often self-limited and trauma-related. Notably, they may also be a feature of potentially life-threatening conditions (such as sepsis, malignancy, or nonaccidental injury) and are common in many chronic pediatric conditions such as inflammatory bowel disease, cystic fibrosis, and juvenile idiopathic arthritis. Care pathways invariably result in children with musculoskeletal features presenting initially to doctors in primary care who require competent musculoskeletal clinical skills to facilitate appropriate triage to specialists and early diagnosis. However, poor self-rated confidence and poor documentation of pediatric musculoskeletal assessment have been reported by primary care providers and those in secondary specialties,[5,6] presumably resulting from inadequate pediatric musculoskeletal clinical skills teaching.[7-14] Such observations are likely to contribute to the reported delay in access to care for children with juvenile idiopathic arthritis and other conditions.[15,16]

Over the last decade, the GALS (Gait, Arms, Legs, and Spine) screening examination,[17] which provides a simple approach to assessment of locomotor system in adults, has been widely taught at U.K. medical schools and shown to improve performance in clinical practice.[18] A pediatric version of adult GALS (called pGALS), has been validated in school-aged children within a pediatric rheumatology setting with excellent sensitivity and specificity.[19] The aim of this study was to assess the acceptability and feasibility of performing pGALS in an acute pediatric setting by a "non-expert" in musculoskeletal medicine and to emphasize the importance and relevance of musculoskeletal assessment as a "core" pediatric clinical skill to be learned and integrated into clinical practice.

Methods

The Children's Assessment Unit (CAU) at North Tyneside General Hospital, Northumbria NHS Trust, receives more than 2000 children per year with referrals from general practitioners directly or via the hospital accident and emergency department and operates every day from 8 AM to 10 PM. Fewer than 5% of children are admitted outside these hours, and these are assessed on the inpatient unit. On the CAU, children are assessed by doctors working in general pediatrics under the supervision of experienced senior pediatricians. This study involved recruitment of consecutive school aged children (ie, 4-15 years) attending the CAU as new patients over a 3-month period.

Informed consent was obtained from the parent/guardian (from here referred to as parent) and assent from older children (aged 8 or above). Children deemed

CAU	Children's Assessment Unit
GALS	Gait, Arms, Legs, and Spine screening
pGALS	Pediatric Gait, Arms, Legs, and Spine screening

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too unwell (by the parent or the doctor) to participate, and elective attenders (ie, patients attending for clinical review or investigation), were excluded. Children were assessed as per routine clinical practice by the doctor on duty and if eligible by age were approached to take part in the study. Patients recruited include those assessed initially by the on-call pediatric doctors, as well as being seen by the principal investigator for the general pediatric assessment. After appropriate consent was obtained, pGALS was performed by the principal investigator in all cases and at the end of the routine clinical assessment.

The protocol included a pseudoanonymized proforma to collect patient demographics, presenting complaint, final diagnosis (from subsequent case note review) and details of the pGALS examination (time taken, the elements of pGALS examination completed with reasons for noncompletion as appropriate and any abnormal findings detected). The parent and child were invited to complete a 0-5 Likert scale assessment of acceptability of pGALS in terms of the time taken for the examination and any discomfort caused. Statistical analysis used nonparametric tests with primary outcomes being the practicality (completeness) and acceptability (time taken and degree of discomfort) of the pGALS assessment. A power calculation on the basis of estimate of completeness of examination (95% CI) with a maximum standard error of 7%, required 50 children to be included in the study. The study was registered with the Trust R&D department and had Regional Ethics Committee approval.

Results

Table I shows the presenting complaints of the children assessed in the study. Over the study period a total of 762 children were assessed on the CAU of which 231/762 (30%) were eligible by age (4-15 years). The aim was to recruit 50 children among consecutive eligible children presenting assessed by another on-call pediatric doctor. All but four of those approached agreed to take part with reasons for nonparticipation given as *child too tired* (n = 1), *child being upset* (n = 2), and family declining to give a reason (n = 1). No children were excluded from the study because of being deemed too unwell. The patient group had a median age of 8 years (range 3.75-15.5 years).

The pGALS examination was completed in most (47/50) patients (Table II), with noncompletion being observed in 3 children with severe illness (pneumothorax, acute asthma, and acute appendicitis); in these cases gait was unable to be assessed, and the child with appendicitis was also unable to perform forward flexion of the lumbar spine. All study participants completed the acceptability questionnaire (Figure), with most parents (47/50, 94%) and children (49/50, 98%) stating that the time taken for the examination was "about right" with a median of 3 minutes (range 1.2-5.3 minutes). There was no significant association between time taken and the age of child or the level of discomfort experienced (data not shown). Where positive findings were found, the time taken for the pGALS examination was significantly longer in comparison with the examination being normal (median time 3.2 minutes [range 2.25-4.50] vs 2.85 [range 1.20-4.50] minutes, Mann-Whitney $P = .032$). pGALS was well tolerated with most children and parents reporting no/slight discomfort (72% and 92% respectively), and all patients with a normal pGALS examination reported no discomfort at all. Notably patients (8/50, 16%) who reported "some/lots of pain" with the pGALS examination had presented with musculoskeletal complaints (such as joint pain or limp) or abdominal pain.

Table I. Patient demographics and their presenting medical problems

	Boys	Girls	Total
Patients assessed in CAU	310	442	762
Patients eligible (age 4-16)	139	92	231
Total included in study (n = 50)	29	21	50
Presenting medical problem			
Vomiting	5 (10%)	5 (10%)	10 (20%)
Abdominal pain (±diarrhea)	5 (10%)	1 (2%)	6 (12%)
Limp	4 (8%)	1 (2%)	5 (10%)
Shortness of breath	3 (6%)	1 (2%)	4 (8%)
Joint swelling	3 (6%)	0 (0%)	3 (6%)
Non-joint lump or swelling	0 (0%)	3 (6%)	3 (6%)
Syncope	2 (4%)	1 (2%)	3 (6%)
Hematuria	1 (2%)	2 (4%)	3 (6%)
Ear pain	0 (0%)	3 (6%)	3 (6%)
Rash	1 (2%)	1 (2%)	2 (4%)
Ataxia/movement disorder	2 (4%)	0 (0%)	2 (4%)
Chest pain	0 (0%)	1 (2%)	1 (2%)
Testicular pain	1 (2%)	0 (0%)	1 (2%)
Widespread joint pains	0 (0%)	1 (2%)	1 (2%)
Back pain	0 (0%)	1 (2%)	1 (2%)
Knee pain	1 (2%)	0 (0%)	1 (2%)
Cellulitis	1 (2%)	0 (0%)	1 (2%)

Most children (27/50, 54%) had no abnormality detected on pGALS, although normal variants were observed in 7/50 (14%), including evidence of hypermobility, flat feet, and genu valgum. Many children (23/50, 46%), however, had abnormal or incomplete pGALS assessment, of whom most (17/23, 74%) had evidence of confirmed musculoskeletal disease, and several (13/23, 57%) had musculoskeletal symptoms at presentation; this group included transient synovitis/irritable hip (n = 5), Henoch-Schonlein purpura (n = 4), Legg-Calve-Perthes disease (n = 1), juvenile idiopathic arthritis (n = 1), and idiopathic Baker's cyst that subsequently resolved (n = 1). The commonest joints found to be abnormal on pGALS assessment were hips, knees, ankles and hands (Table III). An additional 4 patients had abnormal findings on the pGALS screen without musculoskeletal presenting complaints, 3 of whom had preexisting MSK problems (namely Osgood-Schlatter's disease [n = 2] and Legg-Calve-Perthes disease [n = 1], with prominent tibial tuberosity and hip restriction, respectively), and 1 child had tenderness on metacarpal squeeze with metacarpal fracture confirmed on a subsequent radiograph; further questioning revealed an injury sustained 2 weeks previously. Within the total group with abnormal pGALS findings, 6/23 (26%) patients had evidence of non-musculoskeletal disease to explain the findings; these included *abnormal gait* caused by groin cellulitis (n = 1) and viral cerebellitis (n = 1), *gait unable to be assessed* because of asthma