

Evaluation of functional outcomes following pollicisation surgery

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Introduction:

Pollicisation is recognised as the procedure of choice for children with congenital thumb hypoplasia of Blauth classification IIIb or greater¹. At the Welsh Centre for Burns and Plastic Surgery (WCBPS) post-operative management and monitoring following pollicisation is led by the Plastic Surgery Occupational Therapy (OT) Service. This includes fabrication of thermoplastic splints, scar management techniques and therapeutic play to optimise functional use of the pollicised digit. Followed by regular functional assessment, therapy interventions and referral for Hand Surgeon opinion as required.

A wide variety of assessments are described in the literature when evaluating functional outcomes following pollicisation. With no existing valid and reliable outcome measure currently available for this patient group.

Objectives:

This service evaluation project aimed to standardise the assessment process and obtain functional outcomes for children following pollicisation surgery at the WCBPS, informed by the current evidence base. Providing a baseline for comparison of outcomes across the service and between individual assessments. Enabling Therapists to track the functional development of children over time, providing a robust evaluation process for therapy interventions and ensuring that detailed and accurate clinical information and recommendations can be provided to patients / parents and Hand Surgeon colleagues.

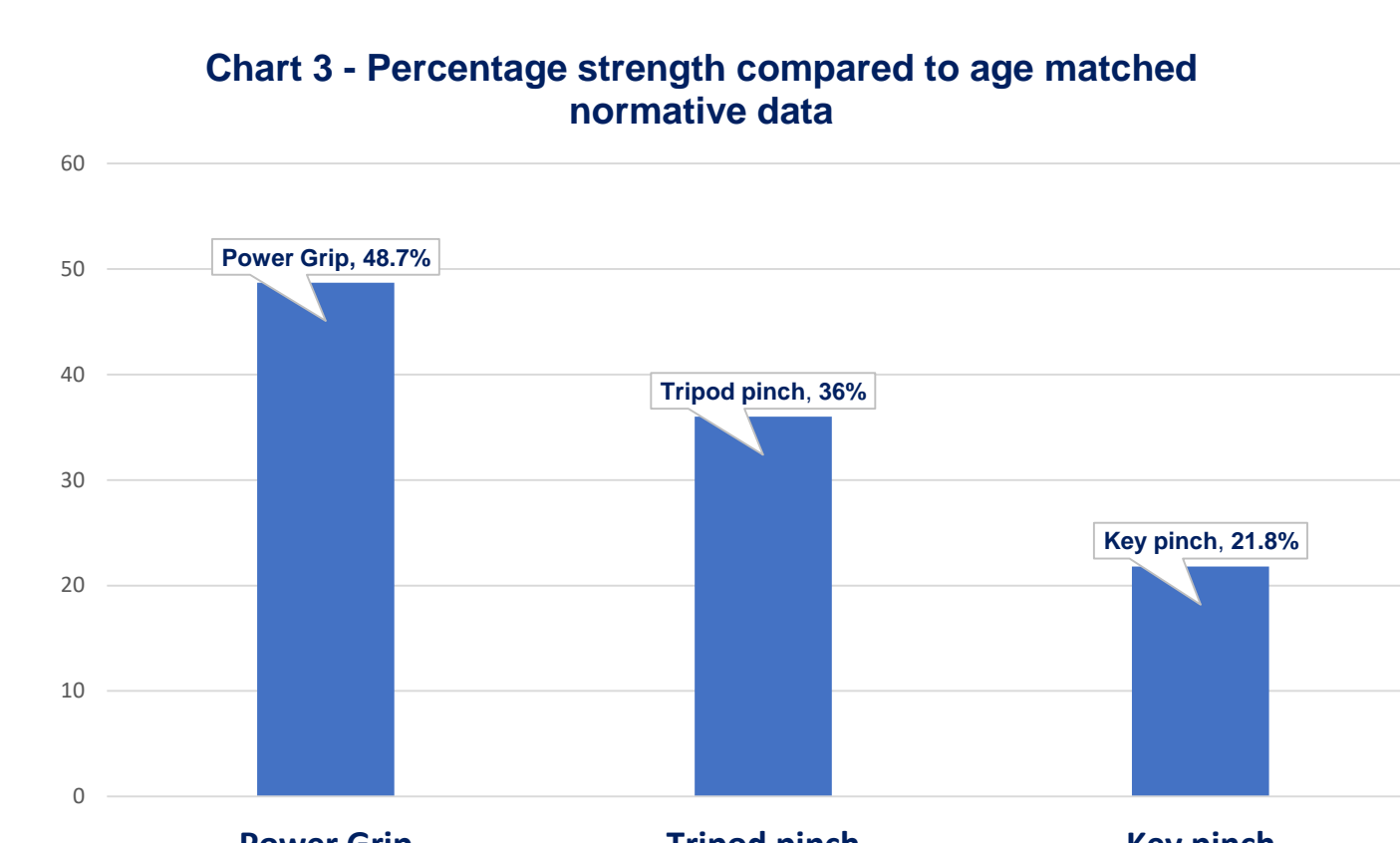
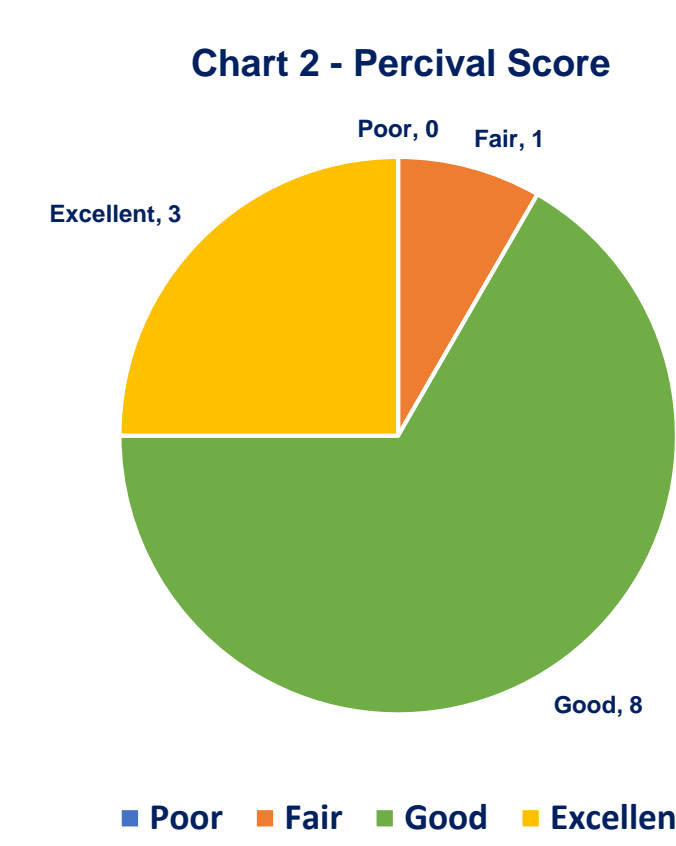
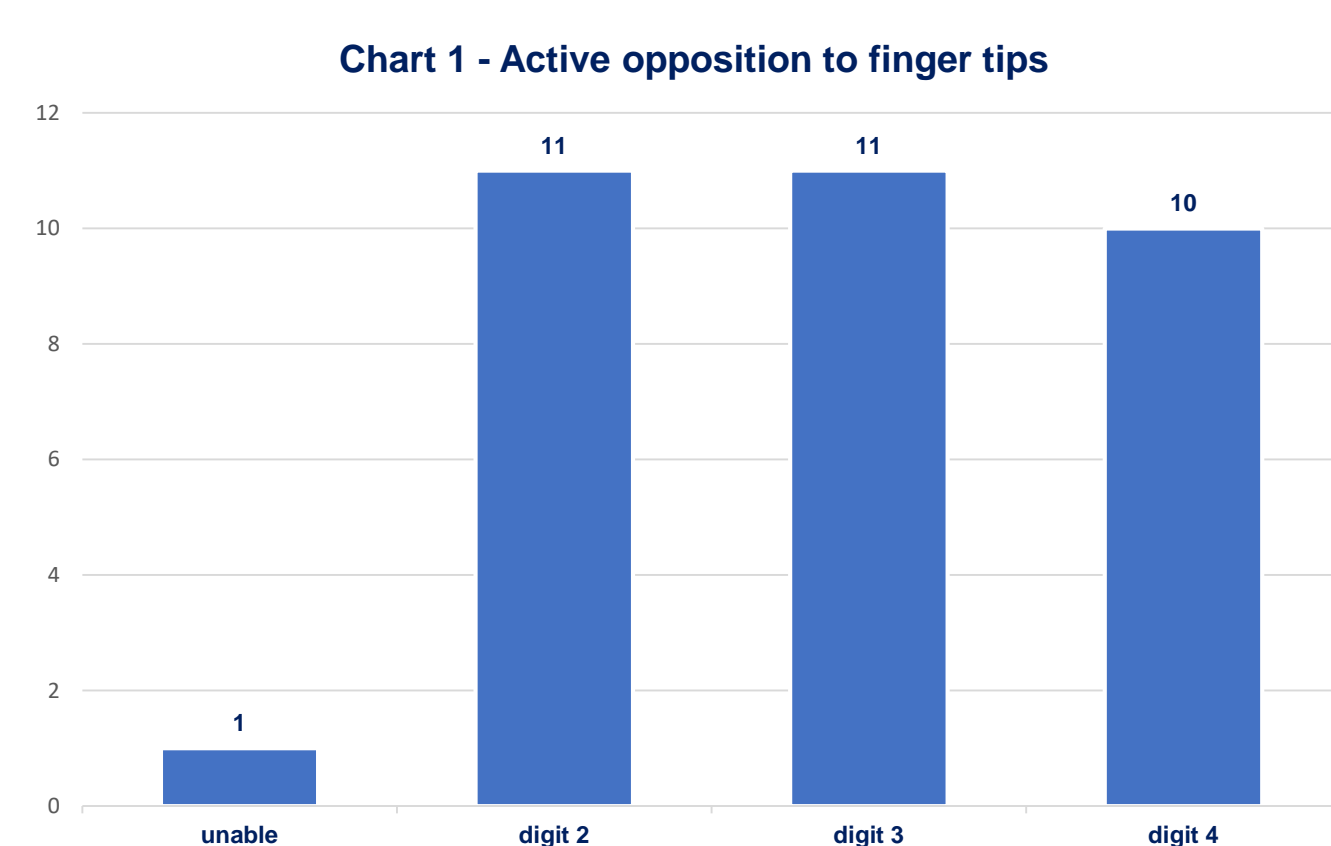
Methods:

Despite no valid and reliable outcome measure existing for children following pollicisation, a review of the current evidence identified common themes for assessment which informed the selection of assessments implemented. The Percival score² is the only assessment designed specifically for use following pollicisation. Despite being criticised for being simplistic and overly positive in its outcomes³, it remains commonly used^{3,4} and is quick and easy to carry out in the clinical setting. Ability to oppose to the finger tips and objective assessment of strength of power and pinch grips were also commonly evaluated in the literature^{5,6,7}. Grip and pinch strength were assessed using the E-Link Hand Grip Dynamometer and Pinchmeter functions on the Biometrics System⁸. No standard method of assessment for function and dexterity was identified from the literature and the PizzaPuttyTM assessment was selected for this purpose due to being easy to administer in the clinical setting with children of all ages⁹, assessing a range of functional grasps and providing a single outcome score. Sensation was assessed in published studies^{6,10}, but was not found to be problematic following pollicisation and can be challenging to assess in young children. Therefore, sensation was not included for assessment. Carlsson et al.'s (2018) qualitative study describes pain and fatigue as factors limiting functional participation for adults following childhood pollicisation¹¹. Therefore, a patient / parent reported questionnaire was included to examine pain, fatigue and satisfaction with functional outcomes, appearance and OT intervention. A proposal was submitted to the Swansea Bay University Health Board, Research and Development Department prior to data collection and the project was ratified as a service evaluation. Therefore, no further ethical approval was required.

Results:

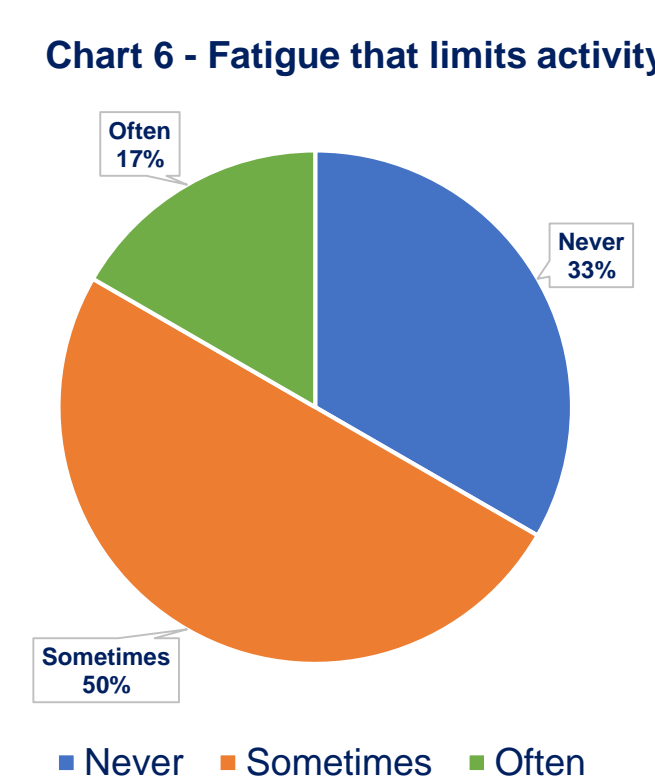
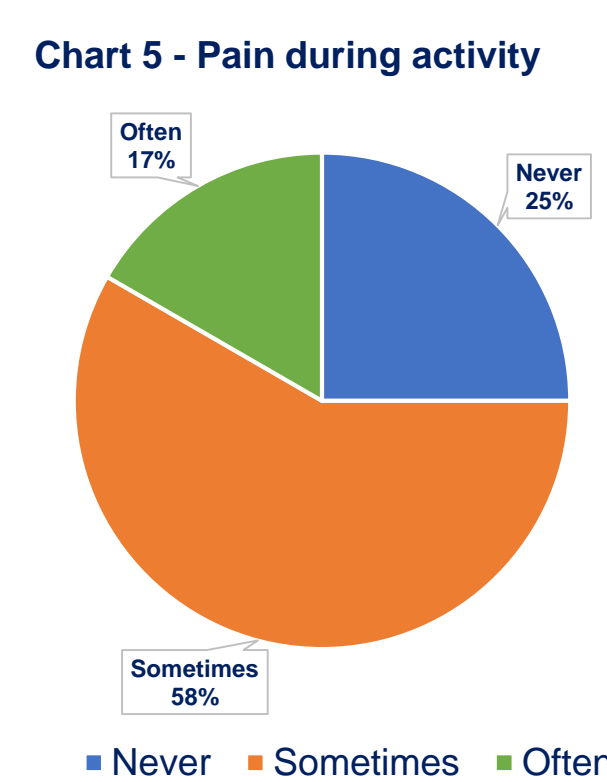
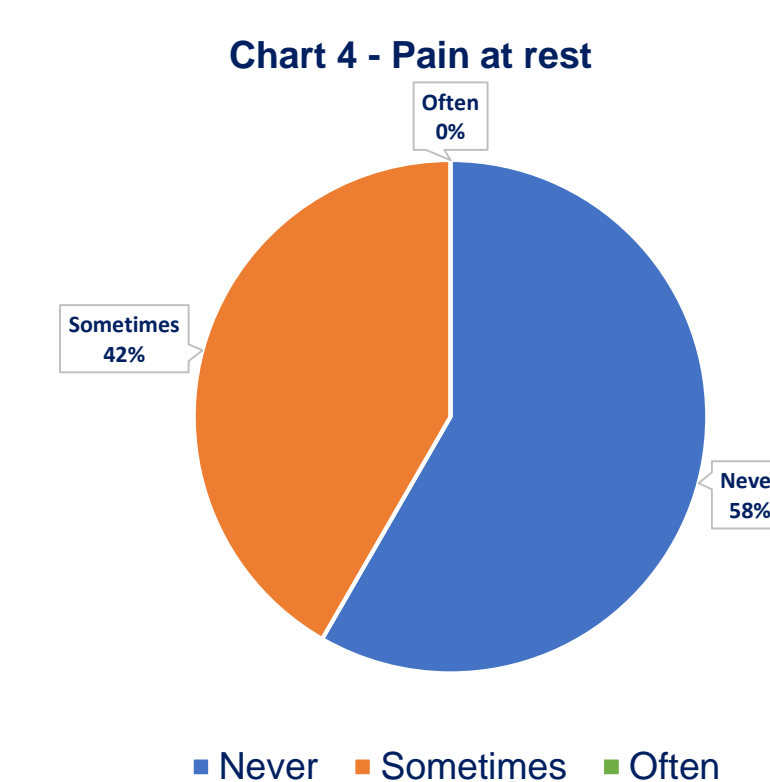
17 patients were identified for assessment. Six had been lost to follow up and were unable to be contacted. Two patients were under four years old and less than one year post pollicisation, and not yet able to carry out the assessments. Therefore, nine patients completed the set of assessments, three had bilateral involvement, with a total of 12 hands assessed. Patient age ranged from seven to 16 years and eight months (mean nine years, nine months). Time since surgery ranged from four years, nine months to 15 years, nine months (mean seven years, ten months). Five patients were female and four male. All assessments were completed by a single Therapist.

All pollicised digits had active movement present at all joints, with ten able to actively oppose to the tip of the little finger and one able to oppose to the tip of the ring finger. One digit was unable to achieve a tip to tip pinch (see Chart 1). 92% (11 digits) achieved a good or excellent result on the Percival score, one scored fair and there were no poor results (see Chart 2). Assessment of power, tripod and key pinch grips showed significant limitation in strength when compared to age matched normative data¹² (see Chart 3). With an average power grip of 48.7%, Tripod pinch of 36% and Key pinch strength of 21.8%.



Despite limited strength, Assessment of function and dexterity using the PizzaPuttyTM assessment showed a high level of skill with an average score of one (range 0 – 4). Observed difficulties included the use of an adapted scissor pinch between the second and third digit and difficulty with in-hand-manipulation due to limited forearm supination in those patients with an associated radial longitudinal deficiency.

Outcomes of the patient / parent reported questionnaires showed that 42% of hands sometimes had pain at rest (see Chart 4). This increased to 58% during activity with 17% often experiencing pain during activity (see Chart 5). In addition, 50% of patients reported fatigue in the hand sometimes limiting their ability to participate in activities, and 17% reported this as happening often (see Chart 6). Despite these findings, 75% of patients / parents were satisfied with the movement and function of the pollicised digit and 67% were satisfied with the strength (see Chart 7). All other patients were neither satisfied nor dissatisfied with movement, strength and function. With one participant stating that she had never known any different. 100% of patients and parents were satisfied with the appearance of the pollicised digit (see Chart 7) and with the OT follow up they received.



How do you feel about...	Dissatisfied	Neither satisfied nor dissatisfied	Satisfied
... the movement of your thumb?	0	3 (25%)	9 (75%)
... the strength of your thumb?	0	4 (33%)	8 (67%)
... the function of your thumb (how it works)?	0	3 (25%)	9 (75%)
... the appearance of your thumb (how it looks)?	0	0	12 (100%)

Discussion:

The primary aim of pollicisation surgery is to provide a functional pinch grip and enable improved span and cylinder grasps which are not available with a four finger hand. Only one patient included in this service evaluation was unable to achieve opposition to the finger tips and scored fair on the Percival score. This patient declined an opponensplasty procedure, stating that she had all the functionality she required from her hand. All remaining patients had functional opposition and Percival scores of good or excellent. Reduced strength of power and pinch grasps is recognised as a limitation of pollicisation^{5,6,7} as the full functionality of the thumb and power of the thenar muscles is unable to be replicated through surgical repositioning of the index finger. The findings of power and pinch grips from this service evaluation are comparable to those reported in the literature^{5,6,7}. Despite limited strength, scores on the PizzaPuttyTM assessment remained low, indicating a high level of functional ability, skill and dexterity. This was also reflected in the patient / parent reported questionnaires with 75% being satisfied with function and the remaining 25% neither satisfied nor dissatisfied. These are similar findings to those in the literature when examining satisfaction^{3,6,7,10}.

Issues of pain and fatigue have not been represented in the quantitative studies examining outcomes following pollicisation. However, this service evaluation would appear to support Carlsson et al.'s (2018) findings from their qualitative study that both pain and fatigue can impact on patients' abilities to participate in their chosen activities¹¹. This is an area that would benefit from further exploration to ensure appropriate therapeutic interventions and support can be provided to optimise participation and minimise the risk of patients being disadvantaged due to pain and fatigue in their hands.

It is recognised that this is a small patient group due to the rarity of the condition. A pre and post-operative assessment study design is not possible due to the young age at which surgery is typically undertaken and rapid changes in hand development. It is also acknowledged that there is potential for bias in these findings as the assessments were completed by the treating Therapist. However, findings of this service evaluation would indicate that the outcomes achieved from Therapy led post-operative management regime following pollicisation provides functional outcomes comparable to those in the evidence base.

Having established a standardised set of assessments to provide outcome data following pollicisation at the WCBPS, a baseline data set has now been established. This will enable the OT service to monitor service provision and ensure that functional outcomes and patient / parent satisfaction are maintained. Assessment of functional development over time will also be possible as children grow and the demands placed upon their hands change, which is not an area that has been adequately explored in the current evidence base. Repeated assessment and comparison will be able to inform the clinical recommendation of individualised therapeutic and / or surgical interventions and effective assessment of their outcomes.

Conclusions:

In the absence of a valid and reliable outcome measure for patients following pollicisation, this set of assessments implemented by the OT service at the WCBPS has provided a mechanism for assessment comparable to the evidence base. All assessments are easily reproducible in the clinic setting, allowing comparison of results across the entire patient group as well as with individual patients over a period of time.

Findings from this service evaluation show that Therapy led post-operative management following pollicisation surgery at the WCBPS provides functional outcomes that are in line with the current evidence base. Good hand function and dexterity can be expected following pollicisation. However, strength will remain limited compared to the wider population. Completion of this baseline set of assessments will enable ongoing monitoring of outcomes to ensure appropriate service provision. In addition, the capability to track hand function development will improve the ability to provide targeted therapy regimes and evaluation of their outcomes.

The impact of pain and fatigue on functional participation requires further attention with this patient group.

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