

Awareness, Perceptions, and Knowledge Gaps Regarding Cranial Remolding Orthosis: A Cross-Sectional Survey Analysis

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ABSTRACT

Background: : Cranial remolding orthosis (CRO) is a custom-fabricated, non-invasive helmet used in selected infants with positional cranial deformities. Awareness alone may not ensure timely assessment or appropriate referral if care-givers and healthcare professionals have incomplete knowledge of the treatment window, duration, or practical requirements. **Objective:** To assess awareness, knowledge, perceptions, and concerns regarding CRO among respondents reached through professional and academic networks. **Methods:** : A quantitative, descriptive cross-sectional online survey was completed by 112 respondents. The questionnaire covered demographic characteristics, prior awareness and information sources, knowledge of CRO indications and treatment characteristics, perceptions of effectiveness, willingness to consider treatment, concerns, insurance coverage, early intervention, and open-ended feedback. Categorical responses were summarised using frequencies and percentages. Open-ended responses were reviewed thematically. **Results:** : Most respondents were healthcare professionals (106/112, 94.6%), and 102 (91.1%) reported having heard of CRO. Among those aware, medical professionals were the most frequently reported information source (88.4%). Although 98.2% were reported to identify plagiocephaly as the condition treated, only 28.6% selected the stated ideal age range and 42.0% identified the typical treatment duration. Perceived effectiveness was positive (91.0%), and 85.7% would consider CRO if recommended by a healthcare professional. Common concerns were child comfort (59.8%), cost (58.0%), and treatment duration (44.6%). Early intervention was rated very important by 94.6%; 87.5% supported insurance coverage. Open-ended feedback highlighted education, affordability, accessibility, and comfort. **Conclusion:** : The findings indicate high reported awareness in this predominantly healthcare-professional sample, alongside gaps in knowledge about treatment timing and duration. Educational initiatives should address these specific knowledge needs and explain practical and financial considerations. Because the sample was convenience-based and heavily weighted toward healthcare professionals, the results should not be generalised to the wider public.

Keywords: Cranial remolding orthosis, plagiocephaly, awareness, knowledge, early intervention, healthcare professionals, cross-sectional survey

INTRODUCTION

Positional cranial deformities include asymmetrical or flattened areas of an infant's skull that may develop in association with sustained positioning. Plagiocephaly commonly refers to an asymmetrical cranial shape, while brachycephaly is generally used for a relatively broad, flattened posterior skull shape. The term "flat head syndrome" is often used in public-facing discussions of these conditions. The clinical significance varies: some positional changes improve with growth and conservative management, while selected moderate or severe deformities may prompt specialist

assessment and consideration of a cranial remolding orthosis.

Cranial remolding orthosis is a custom-fabricated helmet designed to guide cranial growth. The orthosis provides contact over selected prominent regions while leaving room for growth in flatter regions. It is intended to influence the shape of the growing skull rather than to compress the brain. Treatment decisions are individualised and depend on factors such as the pattern and severity of deformity, the infant's age, prior conservative management, clinical assessment, and family circumstances. The manuscript's cited

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background literature describes a period of rapid cranial growth during infancy as important to treatment timing.

Recognition and management involve several linked steps. Parents or caregivers first need to notice a possible asymmetry and seek advice. A healthcare professional must assess the head shape, consider alternative diagnoses where appropriate, explain conservative measures and referral options, and identify whether specialist evaluation is warranted. If CRO is considered, families need clear information about expected wear, follow-up, hygiene, comfort, costs, and realistic treatment goals. Gaps at any point can contribute to delayed assessment, misunderstanding, or reluctance to proceed.

Awareness and knowledge are related but distinct. A respondent may have heard of CRO without knowing the age range in which it is commonly considered, how long treatment may last, or which professionals diagnose, refer, fabricate, and fit the orthosis. Perceptions of effectiveness may also differ from practical willingness to use a device, particularly when families anticipate discomfort, social attention, or financial burden. Understanding these dimensions can help identify where educational material and professional communication may be improved.

The supplied manuscript notes that literature examining baseline awareness and perceptions of CRO among healthcare professionals and educated caregivers is limited. A survey can provide an initial snapshot of what respondents know, how they learned about the intervention, and which barriers they anticipate. However, a survey distributed through professional and academic networks is likely to reach a more medically literate group than a general community sample. This context is important when interpreting high awareness estimates.

1.1 Study objective

The objective was to assess awareness, knowledge, perceptions, and concerns regarding cranial remodeling orthosis among respondents recruited through professional and academic networks, including their understanding of the condition treated, treatment age range and duration, likely prescribers, perceived effectiveness, willingness to consider treatment, and views on early intervention and insurance coverage.

2.1 Study design

A quantitative, descriptive cross-sectional study was conducted using an online questionnaire. The cross-sectional design captured respondents' reported awareness, knowledge, and perceptions at one point in time. It was not designed to evaluate treatment outcomes in infants or to establish causal relationships between respondent characteristics and attitudes.

2.2 Setting and recruitment

The questionnaire was disseminated through professional and academic networks, with the intended audience likely to include people connected with medical and orthotic fields. The manuscript reports 112 completed responses. Recruitment dates, the specific online platform, geographic distribution, the number of people invited, and the number who opened or partially completed the questionnaire were not documented in the supplied version and should be added if these details are available.

2.3 Participants and sampling

A convenience, self-selected sample was used. The resulting respondent group was predominantly composed of healthcare professionals and highly educated participants. Formal inclusion and exclusion criteria are not specified in the supplied manuscript. For transparent reporting, the authors should state who was eligible to respond, whether participants had to be adults, whether the survey was restricted to healthcare professionals or was open to caregivers and members of the public, and how duplicate or incomplete responses were handled. These details cannot be reconstructed reliably from the available manuscript.

2.4 Survey domains and variables

The survey collected demographic information, including age group, gender, highest educational qualification, and healthcare-professional status. Awareness was assessed by asking whether respondents had previously heard of CRO and where they had learned about it. Knowledge items addressed the primary condition treated, the ideal age range for treatment, typical treatment duration, and the professional most commonly associated with prescribing or providing the orthosis.

METHODS



Perception-related items assessed beliefs about CRO effectiveness and willingness to consider the treatment for a child if it were recommended by a healthcare professional. Respondents also identified concerns that might affect acceptance, including child comfort, cost, treatment duration, safety, effectiveness, social stigma, and aesthetic appearance. Further items asked whether CRO should be covered by health insurance and how important early intervention was considered to be. An open-ended prompt invited additional comments and suggestions.

2.5 Data collection and measurement

Survey responses were exported to an Excel spreadsheet. The supplied manuscript does not describe questionnaire validation, pilot testing, the wording and response options for each item, the survey platform, or steps used to prevent duplicate submissions. These details should be reported if documented. The denominator for each percentage should also be checked against the number of valid responses to the relevant item, particularly where respondents could select more than one concern or information source.

2.6 Potential sources of bias

Convenience sampling and voluntary participation may have introduced selection bias: people already interested in orthotics or healthcare may have been more likely to respond. The high proportion of healthcare professionals and respondents with advanced education may have increased overall awareness estimates compared with those expected in the general population. Self-reported responses may also be affected by recall or social-desirability bias. The supplied manuscript does not describe specific procedures to reduce these potential biases.

2.7 Study size

The final analysed sample was reported as 112 respondents. The manuscript does not state whether a formal sample-size calculation was performed or whether the number represents all responses received during the survey period. The rationale for the sample size should be clarified in the final version; no calculation has been added because the necessary assumptions and recruitment information were not supplied.

2.8 Statistical analysis

Categorical variables were summarised using frequencies and percentages. Continuous variables,

where applicable, were described using means and standard deviations. The manuscript states that comparisons between healthcare and non-healthcare respondents were not performed because the non-healthcare subgroup was small. Open-ended comments were reviewed using thematic analysis to identify recurring suggestions and concerns. The coding process, number of reviewers, management of disagreements, treatment of missing responses, and any sensitivity analyses were not described. These details should be added if available.

2.9 Ethics

The original manuscript states that ethics committee approval was not required because no patient data were collected. Because this was a survey involving human respondents, the authors should confirm the applicable institutional determination and report any exemption or waiver reference, if available. The supplied manuscript does not state whether participants were shown an information sheet or provided informed consent before completing the questionnaire. The final manuscript should accurately describe the consent process and data-protection arrangements.

RESULTS

3.1 Respondent characteristics

A total of 112 respondents were reported. Of these, 106 (94.6%) identified as healthcare professionals. The reported highest educational qualifications were doctorate for 55 respondents (49.1%), graduate degree for 30 (26.8%), and bachelor's degree for 23 (20.5%). The reported gender distribution was 75 males (67.0%) and 36 females (32.1%). The most represented age groups were 25–34 years (34 respondents, 30.4%) and 45–54 years (29 respondents, 25.9%). Some reported category counts do not sum to the full sample, which may reflect missing responses or a transcription issue; these figures should be checked against the source spreadsheet before submission.

3.2 Awareness and information sources

Prior awareness of CRO was high in this sample: 102 respondents (91.1%) reported having heard of it. Among respondents who were aware, medical professionals—such as doctors or nurses—were the most frequently reported source of information (88.4%). The internet was reported by 17.6%, family or friends

by 7.8%, and social media by 5.9%. As multiple sources may have been selectable, these percentages should not be expected to total 100%. The prominence of medical professionals suggests that clinical encounters and professional education may be important channels through which information about CRO reaches respondents.

3.3 Knowledge of the condition treated

The manuscript reports that 98.2% of respondents (n=110) correctly identified plagiocephaly or flat head syndrome as the primary condition treated by CRO. The source manuscript also reports three incorrect selections, which does not reconcile with a total sample of 112 if all figures refer to the same item and denominator. The item-level dataset should therefore be checked and the numerator, denominator, and percentage corrected before publication. Subject to this verification, the reported pattern suggests that respondents were more familiar with the condition associated with CRO than with some practical aspects of treatment.

3.4 Knowledge of treatment age and duration

Knowledge of the treatment age range was a prominent gap. Only 32 respondents (28.6%) selected the response designated as the ideal age range in the questionnaire. Forty-six respondents (41.1%) selected “birth to 3 months,” while 28 (25.0%) selected “18 months to 3 years.” These results indicate that many respondents did not choose the age category treated as correct by the survey. The exact age range used as the keyed correct response should be stated consistently throughout the manuscript and supported by the authors’ clinical reference source.

Knowledge of typical treatment duration was also mixed. Forty-seven respondents (42.0%) selected 3–6 months, the response identified in the manuscript as correct. A further 41.1% (n=46) selected either 6–12 months or more than 12 months. The combined percentage is reported in the source manuscript, but the separate counts for these two options are not provided. These findings suggest that the expected duration of treatment may not be well understood by a substantial proportion of respondents.

3.5 Knowledge of the professional involved

Responses regarding the professional associated with CRO were divided. Fifty-seven respondents (50.9%)

selected an orthotist, while 46 (41.1%) selected a paediatrician. Smaller proportions selected a neurologist (5.4%) or general practitioner (1.8%). This distribution may reflect uncertainty about the different roles involved in recognition, diagnosis, referral, fabrication, fitting, and follow-up. The questionnaire wording should be retained in the final report so that readers can understand precisely what “typical prescriber” meant to respondents.

3.6 Perceptions and willingness to consider CRO

Perceptions of effectiveness were generally positive. The manuscript reports that 91.0% agreed or strongly agreed that CRO was effective, including 46 respondents (41.1%) who strongly agreed and 55 (49.1%) who agreed. Neutral responses accounted for 6.3%, and disagreement for 3.6%. These figures suggest favourable attitudes within the sample, although they represent respondents’ perceptions rather than direct evidence of treatment effectiveness.

A total of 96 respondents (85.7%) stated that they would consider CRO for their child if it were recommended by a healthcare professional. Six respondents (5.4%) said they would not, and ten (8.9%) were unsure. The high reported willingness to consider treatment is encouraging, but it should be interpreted in the context of the sample composition and the hypothetical wording of the question. Actual treatment decisions may be affected by clinical eligibility, family preferences, access to specialist services, cost, and the practical demands of wearing and maintaining the orthosis.

3.7 Concerns and barriers

The most frequently reported concern was child comfort, selected by 67 respondents (59.8%). Cost was selected by 65 (58.0%), and treatment duration by 50 (44.6%). Other concerns included safety (37 respondents, 33.0%), effectiveness (36, 32.1%), social stigma (34, 30.4%), and aesthetic appearance of the device (32, 28.6%). Because respondents could select more than one concern, these percentages represent the proportion reporting each issue rather than mutually exclusive categories.

The pattern of responses indicates that favourable views of CRO can coexist with practical reservations. Comfort may be important to caregivers who anticipate daily wear and ongoing follow-up. Cost and duration may influence whether families feel able to

begin or continue treatment. Concerns about safety, effectiveness, social stigma, and appearance may require clear, individualised counselling. The survey did not measure the actual experiences of families using CRO, so these items should be interpreted as anticipated concerns rather than documented treatment complications.

3.8 Insurance coverage and early intervention

Ninety-eight respondents (87.5%) believed CRO should be covered by health insurance. In addition, 106 respondents (94.6%) rated early intervention as "Very Important." These responses indicate strong support for early attention to cranial deformity and for financial coverage among the surveyed group. However, these are opinions expressed by respondents and do not establish the clinical eligibility of any individual infant, the cost-effectiveness of treatment, or the availability of insurance benefits.

3.9 Themes from open-ended responses

Four recurring themes were described in the source manuscript. First, respondents called for greater awareness and education, including awareness programmes and continuing medical education. Second, affordability and accessibility were emphasised, with comments suggesting that more affordable solutions and broader access could help families. Third, several responses expressed positive reinforcement for CRO as a treatment option. Fourth, respondents suggested practical improvements, including webinars and research into more comfortable helmet materials and shapes.

These qualitative comments complement the closed-ended findings: respondents reported high general awareness while still identifying a need for more targeted education. The qualitative results are illustrative, however, because the manuscript does not report the number of comments contributing to each theme, the coding framework, or the method used to establish thematic saturation. The themes should therefore be presented as recurring patterns in the responses rather than as prevalence estimates for the wider population.

DISCUSSION

This cross-sectional survey describes awareness, knowledge, perceptions, and anticipated barriers relating to cranial remolding orthosis in a sample of 112

respondents. The main findings are high reported awareness, positive perceived effectiveness, and a high stated willingness to consider CRO if recommended by a healthcare professional. At the same time, respondents showed less consistent knowledge of the treatment age range and typical duration, and many identified comfort and cost as concerns. These findings support a distinction between having heard of an intervention and understanding the practical details needed for informed discussion.

The high awareness estimate should be interpreted alongside the composition of the sample: 94.6% of respondents identified as healthcare professionals. Medical professionals were also the most frequently reported source of information among those aware of CRO. This is consistent with a sample recruited through professional and academic networks, but it does not demonstrate that awareness is equally high among parents, caregivers, or community members. Future surveys that deliberately recruit caregivers and members of the general public could establish whether the same knowledge gaps occur in those groups.

The largest knowledge gaps concerned treatment timing and duration. Only 28.6% selected the survey's designated correct age range, while 42.0% selected the stated typical duration. Incorrect expectations may affect the timing of questions or referrals and may influence family expectations about the commitment involved. Educational resources should therefore explain that treatment decisions are individualised and depend on assessment by appropriately qualified clinicians. They should avoid implying that a single age band or duration applies to every infant.

The distribution of responses about the professional involved in CRO also suggests that role clarification may be useful. Families may encounter several professionals during assessment and treatment. Clear communication about who evaluates the cranial shape, who determines whether specialist referral is appropriate, and who fabricates and fits the orthosis may help respondents understand the care pathway. The survey item, however, should not be interpreted as establishing a universal prescribing model, as professional responsibilities and referral pathways may vary.

Positive perceptions of effectiveness and stated willingness to consider CRO are potentially favourable

for future educational initiatives. Nevertheless, the survey measured beliefs and hypothetical intentions, not actual uptake or clinical outcomes. The finding that comfort was the most common concern suggests that counselling should address the expected wearing routine, monitoring, hygiene, fit, and the process for raising concerns with the treating team. Similarly, cost and treatment duration should be discussed transparently so that families can make informed decisions.

Support for insurance coverage was high, with 87.5% favouring coverage. This may reflect the perceived financial burden of orthotic treatment, but the survey did not assess actual household costs, insurance policies, or economic outcomes. The result can be used to motivate further research into affordability and access, rather than as evidence that a specific reimbursement policy is clinically or economically justified. Future work could explore how cost, location, availability of trained providers, and caregiver understanding affect access to assessment and treatment.

The open-ended responses reinforce the quantitative findings by calling for broader awareness, continuing education, affordability, accessibility, and improved comfort. The call for awareness despite high reported awareness may indicate that respondents distinguish between basic familiarity and the depth or reach of public knowledge. It may also reflect the professional-network composition of the sample. Educational initiatives could be tailored separately for healthcare professionals and caregivers, with clear explanations of the condition, the role of conservative measures, referral pathways, and the factors that influence treatment decisions.

4.1 Strengths

The survey considered several dimensions of CRO understanding rather than measuring awareness alone. It included knowledge questions, perceived effectiveness, willingness to consider treatment, anticipated barriers, views on insurance coverage, and open-ended feedback. The combination of closed-ended and qualitative responses provides a broader descriptive picture of the issues identified by this respondent group.

4.2 Limitations

Several limitations should be considered. First, convenience sampling and self-selection limit representativeness. Second, the sample was predominantly healthcare professionals and highly educated respondents, while parents and caregivers from varied socioeconomic and educational backgrounds were likely underrepresented. Third, the manuscript does not distinguish among different categories of healthcare professionals, which could conceal variation in knowledge across roles. Fourth, the questionnaire's development, validation, pilot testing, and exact wording are not described. Fifth, the report does not fully document recruitment dates, participant flow, missing responses, or the rationale for the sample size. Finally, qualitative analysis is described only briefly, and no inferential comparisons were conducted. These limitations mean that the results should be treated as descriptive and hypothesis-generating.

4.3 Generalisability and implications

The findings are most applicable to the respondents who participated and should not be assumed to represent all healthcare professionals, caregivers, or the general public. Even so, the observed gaps provide a practical basis for developing and testing targeted educational materials. Future studies should recruit larger and more diverse groups, describe sampling and response rates, use a clearly documented questionnaire, and compare knowledge across relevant respondent categories where sample sizes permit.

CONCLUSION

In this convenience sample, reported awareness of cranial remolding orthosis was high and perceptions of effectiveness were generally positive. However, knowledge of the treatment age range and typical duration was less consistent. Child comfort, cost, and treatment duration were common anticipated concerns, while most respondents supported early intervention and insurance coverage. These findings suggest that education should move beyond basic awareness to provide balanced, practical information about assessment, treatment timing, expected commitment, professional roles, comfort, and affordability. The results should be interpreted cautiously because the sample was predominantly healthcare professionals and the survey methods were incompletely documented.

6. Reporting and declarations

Ethics approval and consent: The source manuscript states that ethics committee approval was not required because no patient data were collected. The authors should confirm the applicable institutional determination and state whether informed consent was obtained from survey respondents.

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