Profile Of Children Referred To Primary Health Care Physiotherapy: A Longitudinal Observational Study In Norway

Kari Anne I Evensen (karianne.i.evensen@ntnu.no)  
Norwegian University of Science and Technology  https://orcid.org/0000-0002-0129-0164

Siw Sellæg  
Trondheim kommune

Anne-Cath Stræte  
Trondheim kommune

Anne E. Hansen  
Trondheim kommune

Ingebrigt Meisingset  
Norges teknisk-naturvitenskapelige universitet

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Abstract

Background

Children are referred to primary care physiotherapy services for a variety of reasons, ranging from concerns for motor development to the need for extensive habilitation services. There is limited knowledge about their characteristics and outcome. The aim of this study was to describe the variation in baseline demographical and clinical characteristics as well as treatment outcome at follow-up six months after baseline.

Methods

Children referred to primary care physiotherapy in a municipality in Norway were invited to participate in this longitudinal observational study. The children's demographics, causes of referral, functional diagnoses, influence on their daily activities, main goals and planned treatments were registered at baseline. Goal attainment and treatment compliance were registered at follow-up maximum six months after baseline.

Results

Baseline characteristics were registered for 148 children by the physiotherapist and for 101 (68.2%) children by their parents. Half of the children were referred from child health care centres due to concerns for motor development, asymmetry and orthopaedic conditions, and most of these children were below the age of one year. There was partly agreement between causes of referral and the physiotherapists' functional diagnoses. The children's daily activities were little affected by the problem or complaint for which they were referred. About a third of the children needed only examination. Follow-up data was registered for 64 children. The majority achieved their main treatment goal and the treatment was carried out as planned.

Conclusions

This study describes the profile of a broad spectrum of children referred to physiotherapy in primary health care in Norway. Our findings may guide further interdisciplinary collaboration and knowledge transfer between professionals involved in child health care with the goal to balance the use of resources to the need for physiotherapy.

Trial registration:

ClinicalTrials.gov Identifier: NCT03626389. Registered on August 13th 2018 (retrospectively registered).

Background

According to Norwegian laws, the primary health care services should promote public health, prevent, diagnose and treat illnesses and offer medical habilitation and rehabilitation (1). For children, all Norwegian municipalities are required to provide health services in maternity care, child health care centres for the population aged zero to five years, school health services and youth health centres up to age 20 years (2, 3). These are means to reduce social inequalities and should be low threshold services, i.e. free of charge and allowing parents and children to make contact without appointment or referral (2). Eliciting and attending to parental concerns is a key element of effective developmental surveillance and in line with international best practice (4). To solve the tasks assigned to the primary health care services, the municipalities provide physiotherapy services, which are partly carried out at the child health care centres, at home, in kindergarten or at school. As primary health care encompasses a wide range of health and personal social services delivered by a variety of professionals, the municipally employed physiotherapists (PTs) have a close collaboration with other professionals in the municipality as well as those working in specialised health care services.

Children are referred to primary health care PTs from different professionals and for a variety of reasons. Public health nurses, general practitioners, occupational therapists, health professionals at hospitals or personnel in kindergarten or school may all request physiotherapy. Physiotherapy may also be initiated on basis of parental concern. Public health nurses have a key role as they are the primary care providers who meet with the families first and most frequently (4, 5). The causes of referral may range from concerns for abnormal motor development, infant asymmetry, orthopaedic conditions and prevention of obesity to chronic or neurological conditions and need for habilitation services. Suspected motor delay or motor problems should be timely referred (5), as there is an assumption that early intervention enhancing brain plasticity may be particularly beneficial (6–9). Also, motor difficulties may have consequences in other domains beyond motor skills (10, 11). However, not all causes of referral may constitute concern or affect the life of the child and the family. Thus, there may be cases in which the PT evaluates the child as typically developing and not in need for physiotherapy. These cases of over-referrals may demand time and resources worth spending elsewhere.

Because of the heterogeneity in need for physiotherapy, some children are only assessed once with no further follow-up, whereas other children need longer treatment or follow-up periods. There is limited knowledge of the characteristics and outcome of children receiving physiotherapy services in Norway. The aim of this study was therefore to provide a descriptive overview of 1) baseline demographic and clinical characteristics of children
receiving physiotherapy in primary health care. We also examined 2) the influence of the problem or complaint on the child’s daily activities and the PT’s functional diagnosis. Further, we assessed 3) goal setting and plan for treatment as well as goal attainment and treatment compliance at follow-up six months after baseline for children where physiotherapy was initiated.

Methods

Design and setting

Through the Research Program for Physiotherapy in Primary Health Care, the FYSIOPRIM, a set of standardised methods and tools have been developed, enabling studies of clinical courses for patients receiving primary care physiotherapy (12). The present study is a longitudinal observational study of children referred to physiotherapy in Trondheim Municipality, which is in the middle part of Norway. Trondheim has around 194 000 inhabitants and is the third largest municipality in Norway.

Baseline data was prospectively collected for newly referred children during a period of 12 consecutive months from May 1st 2016 through April 30th 2017 with follow-up data collected maximum six months after baseline. The study was conducted according to the Helsinki Declaration. Written informed consent was obtained from one or both parents of all children. Ethical approval was granted by the Regional committees for Medical and Health Research Ethics in Norway (REC no. 2013/2030).

Participants

All children aged 0–18 years referred to physiotherapy in Trondheim Municipality, Norway, were eligible for inclusion. A total of 693 children was referred to physiotherapy during the 12-month inclusion period. Exclusion criteria were parents not able to understand Norwegian or English as the consent information for the project was only available in these languages, and the parent-report questionnaires were only available in Norwegian. Flow of children included in FYSIOPRIM is shown in Fig. 1.

Data collection procedure

The parents of all eligible children were asked to participate prior to or during the first consultation with the PT. A tablet application was used for electronic data collection, and parents also had the opportunity to answer questionnaires through an e-mail link (12). This study used baseline data registered by the PT and the parents separately and in collaboration and only data registered in collaboration at follow-up, due to a substantial amount of missing parent-reported data at follow-up. The questions developed for this study is provided as Additional File 1, none of which are under a license.

Baseline assessment

At baseline, the PT registered the child’s sex, age, referral entity and cause of referral (Additional File 1). Referral entities included child health care centre, hospital, kindergarten, school, school health care services, general practitioner, children’s and family’s services, occupational therapist, proxy/parent and other. Due to few referrals from children’s and family’s services and occupational therapists, these were included in the category of “other”. Causes of referral included concerns for motor development, asymmetry (0–1 years), orthopaedics (gait, foot alignment), prematurity (0–1 years), established neurological diagnosis/syndrome, physical activity advice, multidisciplinary assessment, heart or lung disease and other (overweight, juvenile arthritis, cancer, fractures, pain, myalgic encephalomyelitis, referral for assistive devices). Due to few referrals for multidisciplinary assessment and heart or lung disease, these were included in the category of “other”.

The parents reported on the child’s living situation (living with one/both parent(s), number of siblings), the child’s daily arena (home/kindergarten/school), parents’ highest level of education (primary school or lower/high school/up to 4 years of college or university/more than 4 years of college or university), whether the child was born at term (≥ 37 weeks of gestation, yes/no) and use of hospital services the last 12 months (yes/no). Pain was assessed with the question: “If applicable, does the child have pain?”, with yes/no as response options. The influence on daily activities was assessed by the question: “How much does the problem or complaint affect the child’s daily activities?”, with response options on a 6-point Likert scale (very much/much/some/little/very little/not at all) (Additional File 1).

The PT’s functional diagnosis was registered as free text and categorised into “normal findings”, “motor difficulties”, “asymmetry”, “foot alignment”, “established neurological diagnosis/syndrome” and “other”. Main goal for treatment as well as plan for treatment were registered as free text in collaboration with the parents. We categorised the main goal into “no further follow-up”, “normalise or optimise motor development”, “achieve symmetrical movements”, “pain reduction”, “further examinations” and “other”. Plan for treatment was categorised into “no need for treatment”, “further examinations”, “advice/guidance of parents”, “stimulation to active movements”, “adaptation of the environment and positional support”, “stretching” and “other”.

Follow-up assessment

At follow-up, goal attainment was assessed by the PT and the parents in collaboration on a 3-point Likert scale by the question: “To which extent was the main treatment goal achieved?” The response options were 1) achieved, 2) partly achieved and 3) not achieved. Treatment compliance was assessed by the question: “To which extent was the treatment carried out as planned?” with the response options 1) performed, 2) partly performed and 3) not performed (Additional File 1).
Statistical analyses

Data was analysed in SPSS version 25 (IBM SPSS Statistics. Statistical Package for Social Sciences) and STATA 15.1 (StataCorp. 2017. Stata Statistical Software: Release 15. College Station, TC: StataCorp LLC). Descriptive statistics and cross tabulations were used to describe the profile of the children. To assess the impact of missing data, we compared sex, age, referral entity, cause of referral as well as living situation, daily arena, parental education, prematurity, use of hospital services, pain and influence on daily activities at baseline between children with and without follow-up data by using t-test for continuous data and chi-square test for categorical data. A significance level of 0.05 was used.

Results

Demographical and clinical characteristics

Table 1 shows the demographical characteristics of the children included in FYSIOPRIM and Table 2 gives an overview of causes of referral across referral entities. At baseline, 148 newly referred children had their demographic information registered (Fig. 1). Approximately half were males and below the age one year (Table 1).
Goal setting, plan for treatment and goal attainment at follow-up

Parents of 69 (71.1%) children reported that the problem or complaint, for which the child had been referred to physiotherapy, affected the child's daily activities little, very little or not at all (Fig. 2). The child's daily activities were some, much or very much affected only in one of eight (12.5%) children. Reflecting by the age, most children had their home as their daily arena, one fourth were in kindergarten and one sixth in school. One fifth of the children were born preterm, two thirds of these were referred from child health care centres and one third from the hospital (Table 1).

More than 90% of the children were living with both parents, and more than 60% had siblings (Table 1). Reflected by the age, most children had their own home as their daily arena, and the rest (15%) had their daily activities little, very little or not at all (Fig. 2). The child's daily activities were some, much or very much affected only in one of eight (12.5%) children. Reflecting by the age, most children had their home as their daily arena, one fourth were in kindergarten and one sixth in school. One fifth of the children were born preterm, two thirds of these were referred from child health care centres and one third from the hospital (Table 2). A quarter of the children had received hospital services the last 12 months, and 15 (15.2%) children had pain.

Influence on daily activities and functional diagnosis

Parents of 69 (71.1%) children reported that the problem or complaint, for which the child had been referred to physiotherapy, affected the child's daily activities little, very little or not at all (Fig. 2). The child's daily activities were some, much or very much affected only in one of eight (12.5%) children referred for motor development, one sixth (17.4%) of the children referred for asymmetry and half (50%) of the children referred for orthopaedic conditions (data not shown).

The PT's functional diagnosis was registered for 107 (72.3%) of the included children. Normal findings were registered in 24 (22.4%) of them. In 26 (24.3%) children, the functional diagnosis was motor difficulties, in 30 (28.0%) asymmetry and in nine (8.4%) children foot alignment. Ten (9.3%) children had established neurological diagnoses/syndromes and eight (7.5%) had other functional diagnoses. Of the 36 children referred for motor development concerns, 23 (63.9%) were classified as having motor difficulties by the PT, while eight (22.2%) had normal findings, three (8.3%) had a functional diagnosis of asymmetry or foot alignment and two (5.6%) had other functional diagnoses (data not shown). Of the 27 children referred for asymmetry, 24 (88.9%) were classified as having asymmetry by the PT, while the rest (11.1%) had normal findings. Of the 20 children referred for orthopaedic concerns, seven (35.0%) had a functional diagnosis of foot alignment, while 11 (55.0%) were classified as having normal findings by the PT, and the other two (10.0%) had other functional diagnoses (data not shown).

Table 2
Overview of causes of referral across referral entities for children included in FYSIOPRIM.

| Cause of referral | Motor development | Asymmetry | Orthopaedics | Prema-turity | Diagnosis\*/syndrome | Physical activity advice | Otherb | Total |
|-------------------|-------------------|-----------|--------------|--------------|----------------------|-------------------------|--------|-------|
| Referral entity   | n (%), n (%), n (%), n (%) | n (%), n (%), n (%), n (%) | n (%), n (%), n (%), n (%) | n (%), n (%), n (%), n (%) | n (%), n (%), n (%), n (%) | n (%), n (%), n (%), n (%) | n (%), n (%), n (%), n (%) | n (%), n (%), n (%), n (%) |
| Child health care centre | 16 (32.0) | 36 (90.0) | 13 (52.0) | 6 (66.7) | - | - | 3 | 74 (50.0) |
| Hospital | 6 (12.0) | 3 (7.5) | 1 (4.0) | 3 (33.3) | 4 (80.0) | 25 (50.0) | 25 (16.9) |
| Kindergarten | 17 (34.0) | - | 3 (12.0) | - | - | - | - | 22 (14.9) |
| School | 5 (10.0) | - | 1 (4.0) | - | 1 (20.0) | - | 1 (6.7) | 8 (5.4) |
| School health care services | 2 (4.0) | - | 4 (16.0) | - | - | - | - | 8 (5.4) |
| General practitioner | 1 (2.0) | - | 2 (8.0) | - | - | - | - | 3 (2.0) |
| Proxy/parent | 2 (4.0) | 1 (2.5) | 1 (4.0) | - | - | - | - | 5 (3.4) |
| Otherc | 1 (2.0) | - | - | - | 1 (25.0) | 1 (6.7) | 1 (0.6) |
| Total | 50 | 40 | 25 | 9 | 5 | 4 | 15 | 148 (100) |

FYSIOPRIM = Research Program for Physiotherapy in Primary Health Care

\*Established neurological diagnosis

\bMultidisciplinary assessment, heart or lung disease, overweight, juvenile arthritis, cancer, fractures, pain, myalgic encephalomyelitis, referral for assistive devices or other

\cChildren’s and family’s services, occupational therapist or other

\dMissing data for two children

Of the 81 children below one year of age, 58 (71.6%) were referred from child health care centres and 16 (19.8%) from the hospital, while the rest was referred from parents, kindergarten and general practitioner (data not shown). The main cause of referral was concern for motor development in one third of the children (33.8%), mainly referred from the child's kindergarten or child health care centre (Table 2), followed by infant asymmetry in 40 (27.0%) children, and orthopaedic conditions, such as gait and foot alignment, in 25 (16.9%) children. The latter two groups of children were mainly referred from child health care centres (Table 2).

More than 90% of the children were living with both parents, and more than 60% had siblings (Table 1). Reflected by the age, most children had their home as their daily arena, one fourth were in kindergarten and one sixth in school. One fifth of the children were born preterm, two thirds of these were referred from child health care centres and one third from the hospital (Table 2). A quarter of the children had received hospital services the last 12 months, and 15 (15.2%) children had pain.

Goal setting, plan for treatment and goal attainment at follow-up

Parents of 69 (71.1%) children reported that the problem or complaint, for which the child had been referred to physiotherapy, affected the child's daily activities little, very little or not at all (Fig. 2). The child's daily activities were some, much or very much affected only in one of eight (12.5%) children referred for motor development, one sixth (17.4%) of the children referred for asymmetry and half (50%) of the children referred for orthopaedic conditions (data not shown).

The PT's functional diagnosis was registered for 107 (72.3%) of the included children. Normal findings were registered in 24 (22.4%) of them. In 26 (24.3%) children, the functional diagnosis was motor difficulties, in 30 (28.0%) asymmetry and in nine (8.4%) children foot alignment. Ten (9.3%) children had established neurological diagnoses/syndromes and eight (7.5%) had other functional diagnoses. Of the 36 children referred for motor development concerns, 23 (63.9%) were classified as having motor difficulties by the PT, while eight (22.2%) had normal findings, three (8.3%) had a functional diagnosis of asymmetry or foot alignment and two (5.6%) had other functional diagnoses (data not shown). Of the 27 children referred for asymmetry, 24 (88.9%) were classified as having asymmetry by the PT, while the rest (11.1%) had normal findings. Of the 20 children referred for orthopaedic concerns, seven (35.0%) had a functional diagnosis of foot alignment, while 11 (55.0%) were classified as having normal findings by the PT, and the other two (10.0%) had other functional diagnoses (data not shown).
Of the 118 children with PT- and parent-registered data (Fig. 1), only examination was registered for 36 (30.5%). Main treatment goal was registered for 109 children, whereof 16 (14.7%) children were among those with only examination and the reported goal was no further follow-up. The most frequent goal was to normalise or optimise motor development in 34 (31.2%) children, followed by achieving symmetrical movements in 31 (28.4%). Further examinations were registered as the main goal for 14 (12.8%) children. For four children (3.7%) the goal was pain reduction and for ten (9.2%) children other.

Plan for treatment was registered for 106 children. Six (5.7%) of these were among those with only examination and did not need any treatment. Further examinations were registered as the planned treatment for 17 (16.0%) children. For 33 (31.1%) children, the plan for treatment involved advice/guidance of parents, and stimulation to active movements in 25 (23.6%) children. Further, adaptation of the environment and positional support were registered for 11 children (10.4%), stretching for two children (1.9%) and other for 12 (11.3%) children.

Of the 25 children whose functional diagnosis was motor difficulties, the main goal was to normalise or optimise motor development in the majority (n = 20, 80.0%) and the planned treatment was advice/guidance of parents in 15 (60.0%) and adaptation of the environment in another four (16.0%). Of the 30 children with functional diagnosis of infant asymmetry, the main goal was to achieve symmetrical movements in 23 (76.7%), and the planned treatment involved stimulation to active movements in 18 (60.0%) children, followed by advice/guidance in nine (30.0%) and adaptation of the environment in two (6.7%). Of the eight children with foot alignment as functional diagnosis, the main goal varied from no need for follow-up in two (25.0%) children, further examinations in three (37.5%) children and guidance of parents, pain reduction or other for the rest, and the planned treatment varied accordingly (data not shown).

Table 3 shows the follow-up data of the included children. Of the 64 children registered at follow-up, seven (13.2%) had only one consultation. Around a quarter had 2–3 consultations and 4–6 consultations, respectively. A third of the children continued physiotherapy after follow-up registration at 6 months (Table 3). Of these, four (22.2%) children were initially referred for motor development concerns, four (22.2%) children for neurological conditions including established diagnoses, four (22.2%) children for asymmetry, two (11.1%) for prematurity, one (5.6%) for orthopaedic condition and three (16.7%) children for other reasons.

| Follow-up PT- and parent-registration (n = 64) | n (%) |
|-----------------------------------------------|-------|
| **Number of consultations**<sup>a</sup>       |       |
| 1                                             | 7 (13.2) |
| 2–3                                           | 15 (28.3) |
| 4–6                                           | 15 (28.3) |
| 7–9                                           | 8 (15.1) |
| >9                                            | 8 (15.1) |
| **Continuing physiotherapy at 6 months**<sup>a</sup> | 18 (34.0) |
| **Goal attainment**                           |       |
| Achieved                                      | 37 (57.8) |
| Partly achieved                               | 26 (40.6) |
| Not achieved                                  | 1 (1.6) |
| **Treatment compliance**<sup>b</sup>          |       |
| Performed                                     | 55 (87.3) |
| Partly performed                              | 5 (7.9) |
| Not performed                                 | 3 (4.8) |

FYSIOPRIM = Research Program for Physiotherapy in Primary Health Care

PT = Physiotherapist

<sup>a</sup>Missing data for 11 children

<sup>b</sup>Missing data for one child

The main treatment goal was achieved in 37 (57.8%) and partly achieved in 26 (40.6%) children (Table 3). Of the children with follow-up data whose PT’s functional diagnoses were motor difficulties (n = 20) and infant asymmetry (n = 22), 12 (60.0%) and 16 (72.7%) children, respectively, achieved the
goal, while the rest partly achieved the goal. In nearly 90% of the children the treatment was carried out as planned (Table 3).

Missing data

There were no significant baseline differences between children with and without follow-up data regarding sex, referral entity, living with both parents, having siblings, having mother and father with higher education, having pain, or influence on daily activities. Children without follow-up data were older (p = 0.024) and in school (p = 0.05), a higher number was referred for orthopaedic conditions (p < 0.001), born at term (p = 0.003) and without hospital consultations the last 12 months (p = 0.037).

Discussion

The present study is the first to describe the broad spectrum of children referred to physiotherapy during one year in a primary health care setting in Norway. As expected, the children were heterogeneous in terms of age and cause of referral. Most were referred from child health care centres for concerns regarding motor development, asymmetry or orthopaedic conditions (including concerns for foot alignment), even though most parents reported that the problem for which their child was referred had little or no influence on their daily activities. There was a large overlap between cause of referral and the PT’s functional diagnosis when it came to motor development and asymmetry, but more than half of the children referred for orthopaedic conditions were classified as having normal findings by the PT. By far the majority achieved or partly achieved their main treatment goal and the treatment was carried out as planned.

Strengths of the present study were the systematic data collection of children receiving primary care physiotherapy services, the inclusion of parent-report, and follow-up registration of goal attainment and treatment compliance. Only 21.4% of the all children referred to primary care physiotherapy in the 12-month period was included. Reasons for not including children were mainly lack of parental consent or the PT not being able to reach the parents (for children in kindergarten or school). Initially, parental consent from both parents was required. However, we experienced that this was sometimes logistically challenging, and after six months of data collection we sought ethical approval to obtain written consent from one of the parents, given that the other parent also received written information about the project. Furthermore, the PTs had ethical concerns about including families with high burden of care and there were language barriers for non-Norwegian speaking families. Even though consent forms were available in Norwegian and English, parent-report questionnaires were available in Norwegian only. Nevertheless, we have previously reported that sex and age distribution as well as cause of referral of the children included in FYSIOPRIM were comparable to those not included (12). Moreover, given that we included new referrals, it is likely that there were few children in need for habilitation services in our material. As these children are usually followed for a long period of time, they constitute a substantial part of the physiotherapy services for children, which was not reflected in this study. There was a considerable proportion of children without follow-up data. Assessment of goal attainment and treatment compliance was not relevant for children with examination only. Furthermore, we did not find baseline differences for most demographic and clinical variables between those with and without follow-up data, but a larger proportion of children referred for orthopaedic concerns and school children had missing follow-up data, and thus we need to be cautious if drawing conclusions about these subgroups. The fact that we have follow-up data on more preterm children and children with hospital consultations the last 12 months, may indicate that our outcome results are more likely to be underestimated than overestimated, as these may be among the most vulnerable groups of children.

Children receiving physiotherapy were mostly young children aged 0–6 years, and half of the referred children were infants below the age of one year. Half of the children were referred to physiotherapy from child health care centres. In the recent years, the Unit for Physiotherapy Services in Trondheim Municipality has developed guidelines for the most common reasons for referral; i.e. infant asymmetry, in-toeing, flatfoot and toe walking (13–17). This effort was made to reduce the number of referrals that we experienced were typically developing children, so that the services could prioritise children in need of treatment. Furthermore, Trondheim Municipality has implemented a joint group consultation by PTs and public health nurses for parents and their infants at age four months. In these group consultations, the PTs address typical motor development by emphasising that every child is developing at their own pace and by illustrating how development may be affected by several factors within the child as well as the interplay between the child, the activities that the child do and environmental factors (18). We experienced these joint consultations as a way of communicating and transferring information between professionals enhancing interprofessional collaboration.

The present results showed that only examination or one consultation with the PT was enough for about one third of the included children. This may indicate that we have not totally succeeded in reducing the number of unnecessary referrals. Also, the fact that the parents reported that their child was little affected by the problem may point in the same direction and question the rationale for referral. However, the latter result may be inherent in the cause of referral and the children’s young age as most infants with asymmetry are for instance not in any pain, and the problem may not (yet) be affecting their daily life. However, an examination and reassuring of parents could still play an important role and prevent other attempts to get help or reassurance from other health care providers. It also fits well with the goal that the primary health care services should provide low threshold services (2). Nevertheless, one cannot rule out that an even closer collaboration between the PTs and the public health nurses may prevent some of these referrals. In Sweden, there is an example of implementation of a screening tool to support the nurses in clinical decision making regarding when to be concerned about motor development (5). In our study, there was a great overlap between referral causes and the PT’s functional diagnoses regarding concerns for motor development and asymmetry, indicating that different professionals in Trondheim Municipality evaluate these conditions similarly. In contrast, more than half of the referrals regarding concerns for foot alignment were classified as having normal findings by the PT. One explanation for this over-referral may be that these cases are more difficult to evaluate for the nurses and they may lack sufficient knowledge. For most foot alignment cases there is no conservative treatment to offer, but simply to observe over time and expect the condition to resolve spontaneously as the
child grows older (14–16). Implementing this knowledge regarding the natural course of foot alignment among public health nurses may be a way of reducing the observed over-referrals. In Norway, there is currently a shift towards more group consultations and less individual appointments according to the updated guidelines of November 2019 for the public health care programme for children aged 0–5 years (2). Group consultations are carried out at four weeks, five months and 17–18 months of age, of which the first two may involve a PT, and at ages five, eight and 10 months, group consultations are optional. These group consultations could provide a setting for building trust, quality of relationships and collaboration between professionals, factors which are identified as key characteristics of knowledge transfer and exchange in health care (19, 20).

Of the children where physiotherapy was initiated, about 70% had six or less consultations during the six-month period. Despite the relatively low frequency of consultations, most children either achieved or partly achieved their main treatment goal, and the treatment was carried out as planned. The relatively low frequency of physiotherapy is consistent with the current notion that physiotherapy for children should be family-centred (21) and an integrated part of the child's daily activities at home, kindergarten or school. It is also consistent with the PT's role to guide parents and other caregivers on how to implement intervention in daily life. About 40% of the children needed continued physiotherapy services after the six-month follow-up, and numbers indicated that at least half of this children may be children with more complex problems, such as sustained motor development problems, established neurological diagnoses/syndromes and preterm born children. The latter group may be followed by a PT for surveillance even though they may not have current problems (22). It is reassuring that the main treatment goal and planned treatment for asymmetry and foot alignment adhered to our guidelines (14–17), which are based on international literature (23–26).

Conclusions

This longitudinal observational study describes characteristics of the broad spectrum of children receiving physiotherapy in primary health care in Norway. New referrals included mostly young children, referred from child health care centres due to concerns regarding motor development, asymmetry and orthopaedic conditions. About a third needed only an examination. There was agreement between cause of referral and the PT’s functional diagnosis regarding motor development and asymmetry, but more than half of the children referred for orthopaedic conditions were classified as having normal findings by the PT, indicating a potential for better collaboration between public health nurses and PTs. The children's daily activities were little affected by the problem for which they had been referred to physiotherapy, the majority achieved their main treatment goal and the treatment was carried out as planned. Our findings may guide further interdisciplinary collaboration and knowledge transfer between professionals involved in child health care with the goal to balance the use of resources to the need for physiotherapy.

Abbreviations

FYSIOPRIM
Research Program for Physiotherapy in Primary Health Care
PT
Physiotherapist

Declarations

Ethical approval and consent to participate

All parents of children gave written informed consent and the study was conducted according to the Helsinki declaration. Ethical approval was granted by the Regional committees for Medical and Health Research Ethics in Norway (REC no. 2013/2030).

Consent for publication

Not applicable.

Availability of data and materials

The datasets generated and/or analysed during the current study are not publicly available due to permission has not been applied for from neither the participants nor the Ethical Committee but might be available from the corresponding author on reasonable request.

Competing interests

The authors declare that they have no competing interests.

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the project and collection, analysis and interpretation of data or in writing the manuscript.

**Author contributions**

KAIE, SS, ACS, AEH and IM conceived and designed the study. KAIE and IM organised the data collection; KAIE was the principal investigator of the FYSIOPRIM project in Trondheim; IM performed data cleaning and processing of the FYSIOPRIM dataset; KAIE and IM analysed the data and drafted the manuscript; all authors contributed to the revision and editing of the final manuscript.

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Figures
Flow chart of children included in FYSIOPRIM. FYSIOPRIM = Research Program for Physiotherapy in Primary Health Care PT = Physiotherapist
aBaseline PT-registration includes age, sex, referral entity and cause of referral bBaseline PT- and parent-registration includes PT's functional diagnosis, main treatment goal and planned treatment cBaseline parent-report includes child's living situation and daily arena, parents' education, prematurity, hospital consultations, pain and influence on daily activities dFollow-up PT- and parent-registration includes number of consultations, goal attainment and treatment compliance
Figure 2

Parent-reported influence of the problem or complaint on the child's daily activities (n=97). Red = Very much Orange = Much Yellow = Some Light green = Little Medium green = Very little Dark green = Not at all

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