Introduction

Hydrocephalus is a condition in which there is an abnormal accumulation of cerebrospinal fluid in the head. It can be caused by several conditions (such as aqueduct stenosis or cerebral haemorrhage), and can be either congenital or acquired. The prevalence of hydrocephalus is estimated at 1.5–5 per 10 000 live births.1,2 Hydrocephalus can lead to an unusually large head or a rapid increase in head circumference. Nowadays, a large number of children with congenital hydrocephalus are detected at prenatal ultrasounds. It is not clear what the role of routine head circumference measurements is in detecting children with hydrocephalus. In a recent published study, Zahl et al.3 concluded that most children with an increased head circumference caused by intracranial growth are detected in the first 10 months of life. The goal of our study was to investigate at what age hydrocephalus is detected and to assess the role of head circumference measurements in detecting hydrocephalus.

Methods

In the Netherlands, Youth Health Care (YHC) for children <4 years of age is organized at well baby clinics. Parents and their children visit these clinics 13 times. At each visit, among other things, head circumference is measured until the age of one year. These measurements are entered in appropriate head circumference-by-age growth charts.3 At this moment, there are no official criteria for referral for head circumference in the Netherlands. Usually, children are referred to the general practitioner (GP) if the head circumference is >2.5 Standard Deviation Scores (SDS), or crossing two major centile bands. The GP usually refers to a paediatrician or paediatric neurologist. Some countries (Norway, Canada, United Kingdom) have specific referral criteria for head circumference. These referral criteria are, however, not evidence based.2,4,5

Using the hospital information system of the Wilhelmina Children's Hospital (WKZ), a tertiary paediatric hospital in Utrecht, the Netherlands, we selected all children born between 1 January 1975 and 31 December 2005, with the diagnosis 'hydrocephalus'.

Children with a neural tube defect were excluded. We performed a retrospective chart review in all remaining children. The following variables were registered: sex, date of birth, pregnancy duration, birth weight, date of referral, first referring physician, reason of referral, date of arrival and diagnosis made in WKZ. Analysis was performed using SPSS Statistics version 17.0.

Results

Study group

We found 203 children with the diagnosis 'hydrocephalus'. Fifty-seven children were excluded because the chart was missing or
because all relevant data were missing, leaving 146 children in the study group.

The study group consisted of 72 boys (49%) and 74 girls (51%). Thirty-one per cent of the patients were born prematurely (<37 weeks), and 33% had a low birth weight (<2500 g). The majority of patients were referred by a gynaecologist (30%), paediatrician (32%) or YHC physician (19%). Eleven patients (8%) were referred by other health care workers (GP, physical therapist or neurologist), and in 17 patients (12%), the referrer was not known. In 34% of patients, the hydrocephalus was caused by an aqueduct stenosis.

**Reason for referral**

The reason for referral was recorded in 122 patients. Only the main reason for referral was analysed. Forty-three patients (35%) were referred because of abnormal findings at an ultrasound during pregnancy or directly after birth, 38 patients (31%) because of abnormalities in head circumference and 41 patients (34%) because of other symptoms. Of the patients who were referred because of abnormalities in head circumference, 32 patients (84%) were detected in the first 6 months of life.

**Age at detection**

For 54 patients, age at referral was not known. We used age at arrival at WKZ or age at treatment for hydrocephalus as an estimate for the age at detection of the hydrocephalus. Table 1 shows age at detection of hydrocephalus: 89% (95% CI 82–93%) of patients with hydrocephalus were detected in the first year of life.

Only 15 patients with hydrocephalus were detected after the first year of life. None of these patients were referred because of an abnormal head circumference. The reasons for referral in these 15 cases were as follows: headache, developmental delay, visual problems and epilepsy.

**Patients referred by YHC physician**

Twenty-eight of the 146 patients (19%) were referred by a YHC physician. The most frequent reason for referral was an abnormal head circumference (75%); other reasons for referral were developmental delay, nystagmus and lipoma. Only one child was referred after the first year of life, because of a developmental delay.

**Discussion**

The goal of our study was to investigate at what age hydrocephalus is detected and to assess the role of head circumference measurements in detecting hydrocephalus. The main finding of our study was that the majority (89%, 95% CI 82–93%) of the patients with hydrocephalus is detected in the first year of life. These results are in line with the findings of Zahl et al.

The practical implication of these results is that routine measurements of head circumference in YHC can be limited to the first year of life.

Our results are based on age at referral or (if this was not known) age at arrival or treatment. Possibly, some children with hydrocephalus are detected during the first year of life but have arrived or are treated after their first birthday. This may have biased our results. But if this is the case, this would only give more support to the conclusion that almost all children with hydrocephalus are detected in the first year of life.

Another possible reason for bias might be that some children with hydrocephalus may be missed because of another code or diagnosis used in the hospital information system. However, we assume that this will not be related to the age of detection of the patients. Therefore, this is unlikely to have influenced our findings and conclusion.

The percentage of premature born patients in our study cohort is higher than in the general population (31% vs. 7%). Cerebral problems that can lead to hydrocephalus are more common in prematurely born children. A large proportion of patients with hydrocephalus were referred by a gynaecologist (34%), based on findings at ultrasound during pregnancy. With the increasing use of ultrasound during pregnancy, it is expected that children with a congenital cause for hydrocephalus will be detected prenatally more often.

The number of children referred by a YHC physician was relatively small (19%); this might be an underestimation. In the Netherlands, children are referred by the YHC physician to the GP and the GP then refers the child to a specialist. It might be that the children referred by the GP or the paediatrician and (part of) the children in which the referrer was not known, were also referred by the YHC physician. YHC physicians are aware of the importance of detection and referral of children with an abnormal head circumference. More information is needed about the test characteristics of head circumference measurements and the most optimal referral criteria for detecting pathology.

In conclusion, we found that the majority of patients with hydrocephalus are detected before the first year of life. Therefore, head circumference measurements seem to have little value for detecting hydrocephalus after the first year of life. Further studies are necessary to investigate whether routine measurements lead to early detection of hydrocephalus and improvement of prognosis.

**Conflicts of interest:** None declared.

**Key points**

- The majority of patients with hydrocephalus is detected before the first year of life.
- Head circumference measurements seem to have little value for detecting hydrocephalus after the first year of life.
- Routine measurements of head circumference in YHC can be limited to the first year of life.

**References**


High and growing levels of both mental morbidity, especially depression, and work demands, individually and combined, have an effect on employment consequences. Methods: We conducted a population-based 7-year longitudinal follow-up study with baseline information from the year 2000 on socio-demographics, lifestyle, depressive symptoms and work demands. In total, 5785 employed persons, aged 40 and 50 years, were included. Information about employment status, sick leave and work disability was obtained from registers. Logistic regression models were used to measure separate and combined effects of depressive symptoms and work demands on job change, unemployment and sick leave during 2001–02 and work disability during 2003–07. Results: After adjustment for covariates, high physical work demands and depressive symptoms had a graded effect on subsequent unemployment, sick leave and permanent work disability. Persons with both depressive symptoms and high physical demands had the highest risks, especially for sick leave, but the combined effect did not exceed the product of single effects. Persons who perceived high amount of work changed job significantly more frequently. Conclusion: Persons with depressive symptoms might have an increased risk of negative employment consequences irrespective of the kind and amount of work demands. This might be an effect on the level of work ability in general as well as partly the result of health selection and co-morbidity.

Introduction

In Denmark, as in other European countries, the number of persons leaving the labour market with health-related social benefits has tended to increase over the past decades. In Denmark, 25% of the working-age population receives social security benefits—half of them being certified health-related benefits such as disability pension. The pattern of the disability or early retirement pension diagnoses has changed in Scandinavian as in many other European countries, with an absolute and relative increase of mental disorders. In Denmark, approximately every second person newly entitled to a disability pension has a certified mental disorder. The same proportion has been estimated for persons on long-term sick leave. High and growing levels of both mental morbidity, especially depression, and work demands are assumed to be some of the causes, and each of them has indeed been shown to be determinants of sick leave, unemployment and disability pension. In comparison with other European countries, on the one hand, Danish workers perceive highest control over their work, and on the other hand, they are among those countries with the highest work intensity, regardless of the comparable lower weekly working hours.

It is an essential principle in a universal welfare state that when employees owing to disabilities have temporary difficulties to comply with their work demands, they are entitled to sickness benefits. When disability gets permanent, they will either have the opportunity of getting another job, which fits better to their functional capacity, or they may be entitled to disability pension, if capacity loss exceeds certain thresholds. It is also possible that individuals who perceive work demands exceeding their functional capacity might be motivated to seek more suitable jobs or, if their productivity is affected, might be dismissed.

The latter mechanisms seem relevant for the Danish labour market, which is characterized by high job mobility due to low employment protection, which includes sick workers. Danes change jobs 40% more often than in the rest of European Union. Mobility and flexibility has been combined with both a high level of economic compensation during unemployment or sickness and an active labour market policy with early vocational rehabilitation. This triangular combination is denoted as the Danish ‘flexicurity-model’.

It is an ongoing debate whether this model primarily benefits the healthy worker, who can take advantage of job changes, while unhealthy individuals run a risk of exclusion. This process of health-related selection into and out of certain working or unemployment conditions is often denoted as the healthy worker effect. Furthermore, the principle might work best with defined somatic diagnosis, which is obvious for all parts involved in the rehabilitation process. Depressive symptoms often do not belong to distinct diagnostic entities, and functional limitations are less obvious to the surrounding at the workplace as well as when...