Congenital Disorders

Background information on Orofacial Clefts and the impact of interventions

This document gives a brief overview about the condition, its epidemiology and specific interventions that may reduce its burden.

What are Orofacial Clefts?

Orofacial Clefts (OFC) comprises a group of malformations of varying degrees of severity. They are divided into two main categories: cleft lip with or without cleft palate (CL/P) and isolated cleft palate (CP). A cleft lip can range from the merest nick to an unsightly gap running all the way to the nose. A cleft palate is a gap in the hard roof of the mouth; it can interfere with speaking, breathing and eating and can also raise the risk of repeated ear infections and resulting hearing loss. Surgical intervention can be very effective, but if left untreated, a cleft palate may even result in death through malnutrition or infection. OFC may present in isolation or along with other structural anomalies. They may also present as a result of chromosomal abnormalities (not the subject of this document).

What are the main risk factors?

The differences in prevalence between the sexes (increased in males), and increased prevalence of OFC among the offspring of affected individuals all suggest a higher genetic contribution to OFC than to many other types of congenital malformation. The environmental contribution to aetiology remains uncertain, with an apparent trend of increasing birth prevalence with deprivation, and uncertainty about the role of nutritional deficiencies, particularly folic acid and multivitamins. Particular teratogens which have been associated with increased rates of OFC include tobacco and alcohol. Some studies have shown an increased risk of OFCs as a result of maternal medications such as antiepileptic drugs, however, this is dependent on the drug and dosage[1].

Global epidemiology

Birth prevalence

There are considerable prevalence differences between populations, ranging from around 1.61/1,000 in parts of Latin America to less than 0.4/1,000 in East Africa. However, under-ascertainment of cleft palate may contribute to the reported low prevalence in Africa.

[1] Meador KJ. Effects of in utero antiepileptic drug exposure. Epilepsy Curr. 2008;8(6): 143–147.

Population prevalence

This depends on population age distribution, birth prevalence of OFC and in particular, the proportion of affected pregnancies that result in a stillbirth or mortality early in life due to type and quality of treatment and care.

Mortality

Mortality is dependent on the level of access and quality of health services. Neonatal mortality is assumed to range from 50% in the absence of health services to 2% in areas with modern care. Infant mortality ranges from 55.9% in the absence of health services to 2.2% in areas with modern care. Under-5 child mortality ranges from 61.8% in the absence of health services to 2.2% in areas with modern care. Although survival of people with OFC repaired in infancy is high, there is modestly increased all-cause mortality at all ages. Mortality can be due to starvation/malnutrition caused by feeding difficulties or aspiration pneumonia.

Data contained within PHGDB relate to isolated OFCs, i.e. those that do not present with other structural anomalies or as part of chromosomal anomalies.

Disability and quality of life

Surviving infants with OFC have a range of severities from none to residual physical disability, depending on the severity of the defect and the impact of postnatal management.

Reducing prevalence, morbidity and mortality

Figure 1 illustrates the determinants and interventions for OFC as they relate to key stages in life. Care for individuals with OFCs requires a multidisciplinary approach; the European Cleft Organisation[2] has developed draft best practice guidelines for cleft care from the prenatal period. The main specific interventions are discussed below.

Interventions before pregnancy

These include the maintenance of good periconception folate nutrition, folic acid food fortification aimed at the whole population, and supplementation either to all women or those in the preconception period. Although the role of dietary or supplemental intake of folic acid in human OFC is uncertain, there is some evidence that periconceptional multivitamin supplementation (including folic acid) may reduce the birth prevalence by 30-50%. As folic acid fortification and supplementation is very effective in reducing the incidence and severity of neural tube defects (NTD) and has thus been introduced in many countries, it is useful to bear in mind the potential additional benefit in lowering OFC birth prevalence.

For optimum results fortification should include food staples that are widely consumed across the country. For country specific data on food fortification, go to http://www.sph.emory.edu/wheatflour/index.php. The likely reduction in OFC following folic acid food fortification is estimated as 25% of the observed or estimated fall in birth prevalence of NTD.

Increased prevalence of OFC among the offspring of affected individuals suggests a genetic contribution; therefore family planning measures may also play a role in decreasing the birth prevalence of OFC in high-risk groups. Increased OFC incidence may also be associated

[2] http://www.ecoonline.org/en/health_professionals/

with a short interval between pregnancies: this is thought to be due to nutritional depletion, specifically folate depletion in the mother, particularly in those who are breastfeeding. Increasing the intervals between pregnancies may therefore reduce overall the number of children born with OFC including those born to women with a family history of OFC.

Children born with OFCs have difficulties feeding which leads to increased risk of morbidity and mortality in areas where there is a lack of immediate access to treatment services. This can be reduced by providing mothers with early advice on how to feed an affected child and reassurance that the condition is compatible with life. Targeting of such advice to mothers who are perceived to be at-risk to ensure that they are adequately prepared to care for a child with the condition can also help.

Interventions during pregnancy

Prenatal screening and diagnosis as part of a fetal anomaly scan may identify both isolated OFC and those associated with other malformations. However, this technique does not allow the identification of cleft palates. Early diagnosis allows preparation for the birth of an affected child (e.g. by allowing training of the mother on how to feed her baby) and planning for appropriate care provision at an early point after birth. Worldwide prenatal screening in general has high coverage; however, the quality of the services is variable and the coverage of prenatal screening for structural abnormalities is very low in many places.

Interventions after birth

Newborn screening through physical examination enables early diagnosis of OFC, thereby allowing care to be initiated in a timely fashion. Cleft lips may be obvious at birth, although milder defects may be missed. Cleft palates may be missed at this stage if careful examination of the newborn is not conducted. Worldwide the level of newborn physical examination varies and is dependent on the availability and training of skilled birth attendants.

Improved surgical care reduces early mortality and morbidity associated with OFC. However, as many infants may not have immediate access to surgery, ensuring mothers are given advice on how to feed and care for their baby is important in order to avoid early life mortality. Treatment usually involves one or several surgical interventions, depending on the severity of the defect. This process may extend over several years in cases of severe OFC. Speech therapy and counselling also help improve quality of life and may be long-term requirements.

Cost-effectiveness of interventions

Information relating to the cost-effectiveness of interventions in relation to OFCs could not be identified. Costs of treatment and care from infancy to childhood can be considerable due to the need for special multidisciplinary teams. However, they can allay the social costs as affected individuals are liable to suffer stigmatisation, social exclusion and barriers to employment.

Issues of cost-effectiveness are quite specific to each country as costs can vary considerably. For cost-effectiveness cut-off points for different regions of the world, go to http://www.who.int/choice/costs/CER_levels/en/index.html, and for costs for specific items by region and county, go to http://www.who.int/choice/costs/en/.

What are the main ethical legal and social issues (ELSI) to consider?

The ethical basis for state intervention

When public health interventions (such as folic acid fortification of foods) are targeted at populations rather than individuals the intrusiveness of the intervention, and any risks associated with it, should be balanced against the likely benefits, particularly if a degree of coercion is involved.

Current evidence suggests folic acid fortification and supplementation are very safe interventions, especially with intake levels of up to 1 mg/day of folic acid. Daily intakes under 5mg/day are also likely to be safe. Fortification in high-malaria environments still needs to be examined. Caution has been recommended in these areas. This is because iron, which is often combined with folic acid in food fortification, may increase risk of death in malarial areas; and high doses of folic acid may reduce the efficacy of some antimalarials, such as sulfadoxine and pyrimethamine. At the time of writing, there seems to be no evidence that folic acid in doses used for fortification increases the risk of missing a diagnosis of vitamin B12 deficiency and associated neuropathy. Doses up to 1 mg/day have not been associated with clinically significant drug interactions and can be safely used in controlled epilepsy.

Those that oppose fortification programmes argue that such policies deprive competent adults of the chance to make an autonomous choice. This is particularly the case if all potential sources of a particular product are fortified. As some types of food are less amenable to folic acid fortification than others (for example wheat is more easily fortified than rice), and as some people, usually the most isolated and the less well off in society, may not have access to fortified products (e.g. by relying on subsistence agriculture or local produced products) the exclusive use of food fortification may lead to an unfair distribution and access to the benefits conferred by the fortified foods.

It is possible to preferentially target those who are planning a future pregnancy, or at risk of becoming pregnant, by providing folic acid supplementation in the form of folic acid pills. However, such programmes may be less accessible to vulnerable groups or those of lower socioeconomic class, raising issues of lack of equity in provision of the service.

Birth spacing and contraceptive use

As noted previously, increasing the intervals between pregnancies may reduce the number of children born to women with a family history of OFC. However, achieving increased birth spacing through access to family planning methods remains challenging in many low and middle income countries (LMIC) and is not religiously or culturally acceptable in some settings.

Living with a disability

Those who are born disabled often have a very poor life expectancy, especially in LMIC. This is due to a combination of factors: lack of access to relevant health and social services compounded by social determinants of ill health such as poverty and malnutrition. Whilst in developed countries the effect of severe physical or psychological disabilities may be ameliorated by substantive support from the state, in many LMIC health and social services are lacking, and welfare is limited. In such places the psychological and economic burden of having a disabled child falls entirely on the immediate and extended family.

KEY REFERENCES

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Mossey PA, Little J (2002). *Epidemiology of oral clefts: an international perspective*. In Wyszynski DF (Ed) *Cleft lip and palate. From origin to treatment*. Oxford University Press, 2002.

World Health Organisation. *Global strategies to reduce the health-care burden of craniofacial anomalies.* 2002.

RELATED TOPICS

Preconception care and screening
Prenatal care and screening
Newborn screening
Neural tube defects (information on folic acid fortification)
Teratogens

Figure 1: Needs assessment flowchart for Orofacial Clefts