

Socio-Economic Aspects of Prenatal Diagnosis of Cytomegalovirus (CMV) Infection in Germany: A Burden of Disease Study

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Objectives

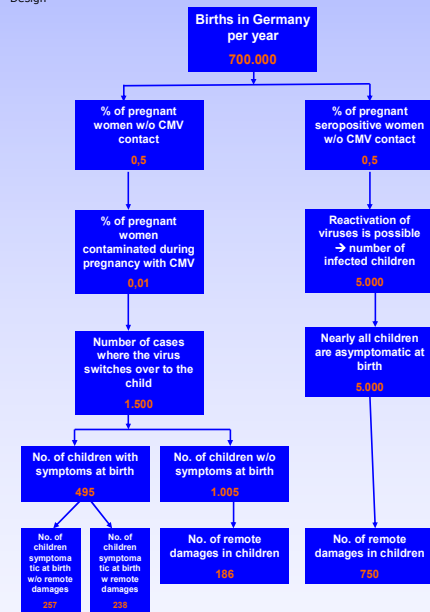
Cytomegalovirus (CMV) can be transmitted to a developing child during pregnancy. In Germany, seropositivity rate is around 50%, risk of seroconversion during pregnancy 1% and congenital infection resulting from primary infection about 50%. Every year 495 infants will be born with congenital CMV-syndrome and 186 infants are infected but asymptomatic at birth and will develop a multitude of abnormalities (hearing loss, mental retardation etc.) due to primary CMV infection just as well as 750 children from seropositive mothers. That means that in Germany each year, an estimated 6,500 children are born with congenital CMV infection, causing an estimated 40 death and leaving approximately 1,200 infants with permanent disability. The disease burden for affected children and parents is enormous.

Methods

The objective of this study was to estimate the total economic impact (lifetime direct and indirect costs based on deliveries p.a.) on society due to CMV-infection based on incidences. Additionally this study shows the positive monetary impact of screening (serologic testing and treatment in case of primary infection) as secondary prevention. Direct costs comprise all treatment costs of symptoms appearing at birth or later on. Indirect costs comprise the changed job situation of parents, work absenteeism, nursing leave, lost human capital of dead people, costs of special schools and nursing homes. All costs represent data from 2008.

The incidences of sequelae were derived from literature. Symptoms after birth with the highest incidence are: petechiae (0,44), hearing loss (0,40), IUGH (0,36), icterus (0,34), hepatosplenomegaly (0,33) etc. Remote damages are: hearing loss (0,22), mental retardation (0,22) etc.

Fig. 1: Epidemiological Model Design



Source: Halwachs-Baumann n.d.

Figure 1 shows the epidemiological structure of the CMV burden of disease model. It exhibits the total number of births per year (n = 700,000) in Germany and distinguishes between pregnant women without prior CMV contact and seropositive women without CMV contact. The path of pregnant women without prior CMV contact differentiates between the number of newborns with symptoms at birth and the number of newborns without symptoms at birth, but with remote damages. The path of pregnant seropositive women includes the number of children with remote damages.

Resource Use and Cost

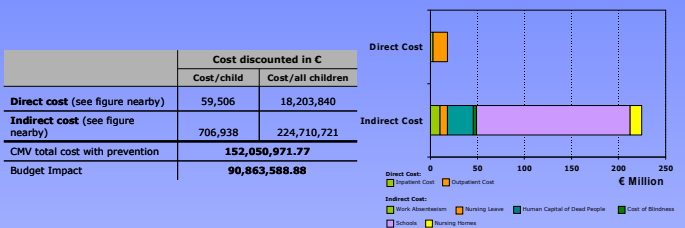
Data on the resource use of CMV infection was collected in two steps. First, the medical resources were derived by literature (e.g. disease specific guidelines). In a second step this literature review was verified by experts. Direct medical costs are derived from a number of publicly available sources like the EBM catalogue as well as the G-DRG catalogue and official price lists for the German Health insurances. Indirect Cost represent statistical and published data as well as own calculations. When necessary, prices were adjusted to 2008 prices using the consumer price index.

Secondary prevention comprises prenatal screening and prenatal management like: serological testing of all pregnant women, follow up tests in seronegative women and prevention with CMV immunoglobulins.

Results

The total discounted costs of CMV infection in Germany from a societal perspective were 243m€ p.a. (941m€ undiscounted), whereas 225m€ p.a. (870m€ undiscounted) are indirect costs. Total costs corresponding to 766,444€ per child (2.97m€ undiscounted). Total costs for diagnosis and prevention are 50.43m€. CMV screening and treatment of primary infected mothers by CMV specific hyperimmunoglobulin reduce total societal costs to 152m€ (444m€ undiscounted) and prevents infection in 640 children. The budget impact amounts to 91m€ (497m€ undiscounted).

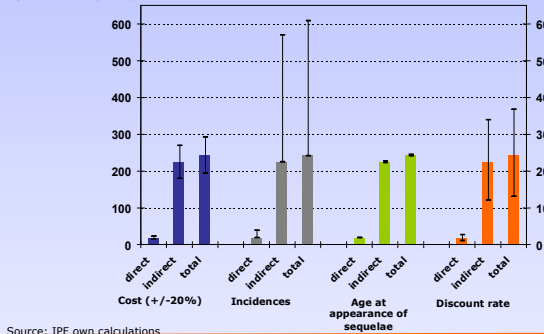
Fig. 2: Total Cost and Budget Impact



Source: IPF own calculations

Results of the sensitivity analysis show that the factors with the greatest influence on costs were the incidence rates of sequelae, with a possible impact of doubling costs. The incidence rates used for the sensitivity analysis were derived from a literature search. These result reflects the importance of reducing the occurrence of sequelae through preventive strategies. The results of the sensitivity analysis moreover show the conservative approach of the cost of illness study.

Fig. 3: Sensitivity Analysis



Source: IPF own calculations

Conclusion

The conclusion based on this calculation is that a secondary prenatal strategy being highly cost effective, leads to cost savings for the whole society, reduces significantly the number of children with sequelae and decreases the disease burden for parents and their children.

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