

Relationships describing bending trajectory of mortality from DNS

If some maximal limit bounds congenital individual risks in the born population, then the following approximation may be valid according to the TCIR (Dolejs, 2001; Dolejs, 2003):

$$\mu(x) = \int_0^{r_{max}} c \cdot e^{(-r \cdot x)} dr = c \cdot \left[\frac{e^{(-r \cdot x)}}{-x} \right]_0^{r_{max}} = c \cdot \frac{e^{(-r_{max} \cdot x)}}{-x} - c \cdot \frac{1}{-x} = \frac{\mu_1}{x} \cdot [1 - e^{(-r_{max} \cdot x)}] \quad (7)$$

In the present study, Di decreased by three orders of magnitude, and $S(x)$ was higher than 0.98 at the age of 10 years. Consequently, the changes in the denominator (number of living persons) with age can be neglected due to the changes in the numerator of equation (1). Based on the TCIR, we simultaneously assumed that the distribution of individual congenital risk r can be approximated by the relationship $f(r) = c/r$. Because the numerator is the partial derivative of $S(x)$ with respect to the variable x , the variable r is only in the exponential term. (Variable r represents the denominator in the frequency function $f(r)$, and it is also the result of the partial derivative in the numerator.) Furthermore, if the product $r_{max} \cdot x$ is small in equation (7), then the theoretical mortality rate is approximately constant according to the following relationship (8) (Dolejs, 2001; Dolejs, 2003):

$$\mu(x) = \frac{\mu_1}{x} \cdot [1 - e^{(-r_{max} \cdot x)}] \cong \frac{\mu_1}{x} [1 - (1 - r_{max} \cdot x)] = \mu_1 \cdot r_{max} \quad (8)$$

If a time unit of 1 year is used, and if r is represented per year, then the product $r_{max} \cdot x$ is unitless. The approximation (8) is valid if the product $r_{max} \cdot x$ is very small, relative to 1.

Table 3

Congenital malformations of the nervous system according ICD10, Chapter XVII, codes: Q00-Q07

Q00 Anencephaly and similar malformations

Q00.0 Anencephaly, Acephaly, Acrania, Amyelencephaly, Hemianencephaly, Hemicephaly,

Q00.1 Craniorachischisis

Q00.2 Iniencephaly

Q01 Encephalocele,

Incl.: encephalomyelocele, hydroencephalocele, hydromeningocele, cranial, meningocele, cerebral, meningoencephalocele,

Excl.: Meckel-Gruber syndrome (Q61.9)

Q01.0 Frontal encephalocele

Q01.1 Nasofrontal encephalocele

Q01.2 Occipital encephalocele

Q01.8 Encephalocele of other sites

Q01.9 Encephalocele, unspecified

Q02 Microcephaly

Incl.: Hydromicrocephaly Micrencephalon Excl.: Meckel-Gruber syndrome (Q61.9)

Q03 Congenital hydrocephalus

Incl.:hydrocephalus in newborn Excl.: Arnold-Chiari syndrome (Q07.0), hydrocephalus: acquired NOS (G91.-), acquired, of newborn (P91.7) due to congenital toxoplasmosis (P37.1), with spina bifida (Q05.0-Q05.4)

Q03.0 Malformations of aqueduct of Sylvius, Aqueduct of Sylvius: anomaly, obstruction, congenital stenosis

Q03.1 Atresia of foramina of Magendie and Luschka, Dandy-Walker syndrome

Q03.8 Other congenital hydrocephalus

Q03.9 Congenital hydrocephalus, unspecified

Q04 Other congenital malformations of brain

Excl.: cyclopia (Q87.0), macrocephaly (Q75.3)

Q04.0 Congenital malformations of corpus callosum

Agenesis of corpus callosum

Q04.1 Arhinencephaly

Q04.2 Holoprosencephaly

Q04.3 Other reduction deformities of brain, Absence, Agenesis, Aplasia, Hypoplasia, Agyria, Hydranencephaly, Lissencephaly,

Microgyria, Pachygyria, Excl.: congenital malformations of corpus callosum (Q04.0)

Q04.4 Septo-optic dysplasia

Q04.5 Megalencephaly

Q04.6 Congenital cerebral cysts, Porencephaly, Schizencephaly. Excl.: acquired porencephalic cyst (G93.0)

Q04.8 Other specified congenital malformations of brain, Macrogyria

Q04.9 Congenital malformation of brain, unspecified, Congenital: anomaly deformity disease or lesion, multiple anomalies

Q05 Spina bifida

Incl.: hydromeningocele (spinal), meningocele (spinal), meningomyelocele, myelocele, myelomeningocele, rachischisis, spina

bifida (aperta)(cystica) , syringomyelocele, Excl.: Arnold-Chiari syndrome (Q07.0), spina bifida occulta (Q76.0)

Q05.0 Cervical spina bifida with hydrocephalus

Q05.1 Thoracic spina bifida with hydrocephalus, Spina bifida: dorsal, thoracolumbar

Q05.2 Lumbar spina bifida with hydrocephalus, Lumbosacral spina bifida with hydrocephalus

Q05.3 Sacral spina bifida with hydrocephalus

Q05.4 Unspecified spina bifida with hydrocephalus

Q05.5 Cervical spina bifida without hydrocephalus

Q05.6 Thoracic spina bifida without hydrocephalus, Spina bifida: dorsal NOS, thoracolumbar NOS

Q05.7 Lumbar spina bifida without hydrocephalus, Lumbosacral spina bifida NOS

Q05.8 Sacral spina bifida without hydrocephalus

Q05.9 Spina bifida, unspecified

Q06 Other congenital malformations of spinal cord

Q06.0 Amyelia

Q06.1 Hypoplasia and dysplasia of spinal cord, Atelomyelia, Myelatelia, Myelodysplasia of spinal cord

Q06.2 Diastematomyelia

Q06.3 Other congenital cauda equina malformations

Q06.4 Hydromyelia , Hydrorachis

Q06.8 Other specified congenital malformations of spinal cord

Q06.9 Congenital malformation of spinal cord, unspecified, Congenital: anomaly, deformity, disease or lesion

Q07 Other congenital malformations of nervous system,

Excl.: familial dysautonomia [Riley-Day] (G90.1), neurofibromatosis (nonmalignant) (Q85.0)

Q07.0 Arnold-Chiari syndrome

Q07.8 Other specified congenital malformations of nervous system, Agenesis of nerve, Displacement of brachial plexus, Jaw-winking syndrome, Marcus Gunn syndrome

Q07.9 Congenital malformation of nervous system, unspecified

Table 4**Diseases of the nervous system according ICD10, Chapter VI, codes: G00-G99**

Diseases of the nervous system	G00-G99
Inflammatory diseases of the central nervous system	G00-G09
Systemic atrophies primarily affecting the central nervous system	G10-G13
Extrapyrarnidal and movement disorders	G20-G26
Other degenerative diseases of the nervous system	G30-G32
Demyelinating diseases of the central nervous system	G35-G37
Episodic and paroxysmal disorders	G40-G47
Nerve, nerve root and plexus disorders	G50-G59
Polyneuropathies and other disorders of the peripheral nervous system	G60-G64
Diseases of myoneural junction and muscle	G70-G73
Cerebral palsy and other paralytic syndromes	G80-G83
Other disorders of the nervous system	G90-G99