Validation of Stroke Diagnosis in the National Registry of Hospitalized Patients in the Czech Republic

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Background: Stroke is a common cause of mortality and morbidity in Eastern Europe. However, detailed epidemiological data are not available. The National Registry of Hospitalized Patients (NRHOSP) is a nationwide registry of prospectively collected data regarding each hospitalization in the Czech Republic since 1998. As a first step in the evaluation of stroke epidemiology in the Czech Republic, we validated stroke cases in NRHOSP. *Methods:* Any hospital in the Czech Republic with a sufficient number of cases was included. We randomly selected 10 of all 72 hospitals and then 50 patients from each hospital in 2011 stratified according to stroke diagnosis (International Classification of Diseases Tenth Revision [ICD-10] cerebrovascular codes I60, I61, I63, I64, and G45). Discharge summaries from hospitalization were reviewed independently by 2 reviewers and compared with NRHOSP for accuracy of discharge diagnosis. Any disagreements were adjudicated by a third reviewer. *Results:* Of 500 requested discharge summaries, 484 (97%) were available. Validators confirmed diagnosis in NRHOSP as follows: transient ischemic attack (TIA) or any stroke type in 82% (95% confidence interval [CI], 79-86), any stroke type in 85% (95% CI, 81-88), I63/cerebral infarction in 82% (95% CI, 74-89), I60/subarachnoid hemorrhage in 91% (95% CI, 85-97), I61/intracerebral hemorrhage in 91% (95% CI, 85-96), and G45/TIA in 49% (95% CI, 39-58). The most important reason for disagreement was use of I64/stroke, not specified for patients with I63. *Conclusions:* The accuracy of coding of the stroke ICD-10 codes for subarachnoid hemorrhage (I60) and intracerebral hemorrhage (I61) included in a Czech Republic national registry was high. The accuracy of coding for I63/cerebral infarction was somewhat lower than for ICH and SAH. **Key Words:** Stroke—Czech Republic—validation—epidemiology—registry.
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Introduction

Stroke is the second leading cause of death worldwide after coronary artery disease[1] and is the third most common cause of disability.[2] Although stroke is a significant global health concern, validated, comprehensive stroke epidemiology data and long-term trends are unavailable for many countries.[1]

There are limited available data regarding stroke incidence in Central and Eastern Europe. The burden of stroke is considered to be higher in Central and Eastern Europe than in other parts of the world according to the Global Burden of Disease Study 2010 although such an estimate is based only on "a scarcity of high-quality epidemiological stroke data."[1,3] There are challenges with the available data, given that some of the data are extrapolated from Asia.[4,5] Other data come from before or around the time of collapse of the Iron Curtain in 1989-1990,[6–8], which may differ from more contemporary data given the evolution of management of stroke risk factors in most Eastern European countries. It is also not possible to extrapolate from Western Europe, because of difference in stroke incidence[9–11] and mortality[12–14] between European countries.

Population-based stroke registries and administrative databases containing routine medical information are often used in epidemiological research[15,16]; however, a variable level of accuracy in coding of stroke diagnoses has been reported.[17–30]

The World Health Organization (WHO) has suggested a stepwise approach to stroke surveillance (STEPS Stroke) with the first of the 3 steps being a hospital-based registry.[15]

To provide a detailed assessment of stroke epidemiology in the Czech Republic, as an initial step we will validate an administrative database called the National Registry of Hospitalized Patients (NRHOSP). NRHOSP provides complete identification of all hospital admissions in the Czech Republic. Once validated, the NRHOSP database will provide information about all hospitalized strokes and could potentially serve as a resource for further stroke epidemiologic studies in the Czech Republic.

Methods

Institute for Health Information and Statistics of the Czech Republic and NRHOSP

In the Czech Republic, the Institute for Health Information and Statistics of the Czech Republic has collected information regarding medical information for all patients admitted to hospitals in the Czech Republic since 1992. Data collection was also performed in 1960, 1981, and 1986. The National Health Information System (administered by the Institute for Health Information and Statistics) consists of many registries, including the NRHOSP. By law, all inpatient medical facilities are required to prospectively register all completed inpatient admissions (individual report for each case at discharge). The completeness of the Registry is controlled at the central and regional level. In 1992-1993, International Classification of Diseases Ninth Revision diagnosis codes were used; International Classification of Diseases Tenth Revision (ICD-10) coding has been used since 1994. All inpatient facilities have been included since 1998.

Data for each admission are coded when patients are discharged from the hospital. If a patient has several diagnoses at discharge, the main and up to 4 secondary diagnoses are entered. The health care system in Czech Republic is used by all citizens, and there is no personal expense incurred for health care received. At birth, all people are given a personal identification number with which they can be located in the NRHOSP. Thus, the NRHOSP provides complete identification of all hospital admissions.

According to the Guidelines of the Czech Neurological Society,[31,32] every patient with stroke diagnosis should be hospitalized and receive care in a specialized stroke unit. This recommendation in combination with the mandatory NRHOSP inclusion of all hospital admissions should lead to the NRHOSP providing data regarding virtually all hospitalized stroke cases occurring in the Czech Republic. The current study is validating the coding of the hospitalized strokes only. An ongoing population-based study in the Czech Republic will provide a more detailed assessment of all-stroke incidence, including cases only evaluated in the outpatient setting and those who die before hospitalization.

Data Collection—Random Selection of Hospitals and Random Selection of Records

For validation of the NRHOSP database, we randomly selected 10 hospitals and then 50 patients from each hospital admitted in 2011 were also randomly selected, with 10 cases for each of the following stroke or transient ischemic attack (TIA) diagnoses (ICD-10): I60 (nontraumatic subarachnoid hemorrhage), I61 (nontraumatic intracerebral hemorrhage), I63 (cerebral infarction), I64 (stroke, not specified as hemorrhage or infarction), and G45 (transient cerebral ischemic attack).

For random selection of hospitals and records, we used the PROC SURVEYSELECT in SAS,[33] which uses the simple random sampling, pseudorandom generator of random numbers. We approached randomly selected hospitals and requested discharge summaries for the randomly selected patients in each hospital. Information was retrieved by mail from the departments where they had been admitted. Requested clinical data consisted of discharge summaries, medical records, computed