Residence coding in the Hospital In-Patient Enquiry (HIPE) system: significantly worse than anticipated

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ABSTRACT
Analysis was conducted of the patient residence geocoding of all E-code (external cause) discharges on the Hospital In-Patient Enquiry system for the calendar year 1996 from Limerick's two acute hospitals (one public, one private). The results indicate a substantial level of error, even at county and county borough level. Some 21 percent of the 1383 patients attributed to Limerick County Borough were wrongly assigned to this area. Only marginal differences were reported between the public and private hospitals, with the private hospital managing a slightly higher accuracy rate. The implications of this finding are significant for any analysis of spatial patterns of health care use. Particular care needs to be taken in relation to HIPE patient residence coding relating to any of the county boroughs in Ireland. A software geocoding engine urgently needs to be introduced into the HIPE system capable of geocoding patient addresses at least to district electoral division (ded)/ward level, and ideally to point location.

Key index words: HIPE, geocoding, accuracy, Limerick

Introduction
Public Health surveillance and monitoring requires information that is comprehensive, timely, accurate, relevant, and accessible. A standard information source for population health surveillance is hospital discharge data incorporating International Classification of Disease classification codes (WHO, 1977). Given the costs associated with data collection for specific surveys, there is a considerable literature both utilising this type of routinely collected data, and supporting its use for research, planning and monitoring purposes (Bain et al., 1997; Berkelman and Buchler, 1990). In Ireland this discharge information is recorded in the Hospital In-Patient Enquiry system (HIPE), while patient details may be recorded in the adjoining Patient Administration System (PAS). In light of the linked nature of these two datasets, and the wider knowledge of the HIPE system, the term HIPE will be used throughout this article to refer to this combined system.

Concerns over HIPE coding are long standing (MacIntyre et al., 1997a; Smith, 1989). Most of this concern has focussed on diagnostic and procedural coding. Little or no attention has been paid to HIPE residence coding in Ireland, presumably because little spatial analysis has been conducted here compared to some other countries (such as the UK or the USA). In addition the scale of HIPE geocoding coding in Ireland is so large (county and county borough level) that one might imagine it would result in few or no mistakes. Detailed analysis however revealed that such assumptions were far from correct.
Method

As part of a wider study examining inequality and health, analysis was conducted of the geo-coding of all hospital discharges in 1996 citing an E (external event) Code from Limerick's two acute hospitals, relating to residents coded as being domiciled in Limerick County Borough. Using a combination of street maps and ward address lists all addresses were coded by hand to ward level. The International Classification of Disease classification system (ninth revision, ICD-9) includes an analysis of external causes of injury to assist research into injury prevention (CDC, 1997). Although examination of E-codes has revealed some difficulties, their use has been described as 'feasible and reliable' (Maclntyre et al., 1997b: 779).

Results and Discussion

Data relating to 1383 hospital discharges were received. Examination revealed that 21 percent of the 1383 hospital discharges had been incorrectly assigned to Limerick County Borough. The error rate was broadly similar between each of the main public and private hospitals in Limerick, with the private hospital achieving a marginally better rate (error rate of 19.5 percent, as opposed to 21.4 percent). Some 34 (11.7 percent) of the wrongly coded addresses were obviously from outside Limerick County Borough. These addresses included for example the words county Clare, county Limerick, or county Waterford in the address. However the remaining 257 (88.3 percent) of the incorrectly coded addresses were the result of inaccuracies over the boundary of Limerick City. The main problem appeared to be in conurbations that have spilled over beyond the county borough boundary (see Figure 1). Limerick County Borough, like most regional centers has experienced significant growth in recent years. New housing developments have spilled over beyond the county borough boundary in four main areas. The first of these is to the north-west, broadly following the main road to Ennis, county Clare (Caherdavin). The second main area of development is due east and is centered around the University of Limerick and the Dublin Road (Castletroy). The third main area of development is due south-west and is located around the Regional General Hospital (Dooradoyle), while the fourth and smallest of these over-spills is to the north of the City across the River Shannon, (Shannon Banks).

This study did not undertake an examination of HIPE records of any bordering (or other unrelated) counties to determine the proportion of Limerick County Borough records that had been wrongly geocoded to other areas. However it should be noted that evidence of such mistakes was noted in the ded/ward level re-geocoding of mortality data that took place as part of the mortality study of the Askeaton investigation (for more information on this investigation see Kelleher et al., 2001). Mortality data is currently routinely coded to county and county borough level in the Republic of Ireland and errors in the coding at this level were noted in both directions in the re-geocoding of this data for county Limerick and Limerick County Borough.

The implications of these errors are important. Any HIPE based assessment of spatial patterns of health care use are subject to a substantial error margin as a result of poor geocoding. Further research is required to quantify the level of error in HIPE geocoding generally, and particularly that of the county boroughs. However particular care needs to be taken in analysis that involves any of the county boroughs (Dublin, Cork, Galway and Waterford, as well as Limerick). The main effect of the error noted in this analysis would be
artificially to inflate the numerator in any calculation of health care use (a proxy for ill-health) in an analysis of Limerick County Borough and presumably to deflate it in an analysis of Limerick county. At present this type of error may have little effect on the work of the Department of Health and Children as the coding is currently to county level (including county boroughs). However this level of aggregation is patently unfeasible given well-known urban-rural differences in health experience, health service access and deprivation. Additionally, this level of error must raise serious questions about the accuracy of geocoding in relation to the Tipperary N.R. and Tipperary S.R. boundary. To put the scale of the errors in context, concerns over the accuracy of geo-coding in the NHI system (similar to HIPE) in New Zealand to the much finer spatial scale of Census Area Unit level (average population approximately 2000), has been felt to threaten the viability of this system for population health surveillance (Houghton et al., 2001).

HIPE is the most comprehensive health care database in Ireland at present. There is however an urgent need to improve its accuracy across a range of fields. Other research has noted HIPE's substantial failings in relation to diagnostic and procedural accuracy (Lockwood, 1971; Martini et al., 1976; Medico-Social Research Board, 1979; O'Neill, 1982; Mehanni et al., 1995). The HIPE system also fails to routinely provide data on social class. Unless substantial improvements are made, the viability of using HIPE for any form of analysis must be questioned. This examination provides evidence of further weaknesses to HIPE's already tarnished reputation. The introduction into the HIPE system of a national...
address geocoding software engine capable of locating cases at least to DED level and ideally to point location is an essential step in the reform of the HIPE system.

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References


