The use of acute hospital services by elderly residents of nursing and residential care homes

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Abstract

The objective of this study was to compare hospitalisation rates by cause of admission, hospital death rates and length of stay for residents from nursing and residential care homes with those in the community. This is a retrospective study of acute hospital emergency admissions in one health district, Merton, Sutton and Wandsworth between April 1996 and March 1997. Data linkage and manual look up were used to derive emergency hospital admissions for residents of care homes aged 65 and over. Admission rates were calculated for cause, length of stay and hospital death for residents of care homes and in the community with relative risks. The relative risk of emergency admission from a care home compared with the community was 1.39 for all diagnoses, 2.68 for all injuries, and 3.96 for fracture of neck of femur. The relative risk of dying in hospital for care home residents was 2.58 overall, and 3.64 in the first 48 hours of a hospital stay (all P-values <0.0001). Admission rates were higher from residential than from nursing homes. There was some increase in admissions from homes during holiday periods and over Christmas. In conclusion, there are major difficulties in monitoring admissions from nursing and residential care homes due to poor quality recording and inaccuracies in NHS coding. This was compounded by an absence of data on the age and sex profile and healthcare needs of the resident population in care homes. Prospective studies are required to ascertain when admission is avoidable and when it is appropriate. The information strategy needs to ensure that routine data sources are capable of monitoring the use of hospital services by residents of care homes.

Keywords: acute care needs, long-term care, nursing input, risk factors

Introduction

The structural changes in funding and provision of long-term care which took place throughout the 1980s and 1990s largely removed the responsibility for funding and providing long-term care from the NHS. One consequence compared with 1980 was that the number of people in nursing and residential care sectors has more than doubled from 241 400 (Laing 1996) to 541 000 places in 1999 (Department of Health 2000). The changes in jurisdiction for funding and providing care were accompanied by a devolution in the responsibilities for medical care from hospital specialists to general

practitioners (Majeed & Malcolm 1999). The effect of these changes and their implications for the healthcare needs of frail residents in long-term care has never been properly evaluated. Most studies centre around the appropriateness of admissions to homes and discharge planning arrangements or from the perspective of the general practitioner and their workload (Abercrombie *et al*. 1995, Snape & Santharam 1997, Kavanagh & Knapp 1998). Further to the publication in February last year of the National Beds Inquiry Consultation document, the government has recommended that the NHS expand intermediate care provision in the residential/nursing home sector, in view of the shortage of acute

hospital beds. The location of such beds is not clear but it is likely that the private sector will play a part.

There has been little work on access to and use of acute hospital services by residents in long-term care. Indeed there is often a perception that the home is the end-point for care. Studies of the use of acute hospitals by residents of nursing and residential homes have been mainly carried out in the United States, motivated by concerns about the nature and quality of care delivered to residents in homes and escalating healthcare costs. As a result, many of the studies have focused on levels of staffing and training and levels of expenditure within homes. Barker *et al.* (1994) found that the absence of on-site medical staff was a significant predictor of hospitalisation and that length of stay and mortality rates were higher than for hospitalisations in the community. Fried & Mor (1997) concluded that increased provision for specialist care in nursing homes could prevent a higher rate of hospitalisation among long-term frail nursing residents, especially among those with a recent decline in ability to perform activities of daily living (ADLs) and with a primary diagnosis of respiratory disorder for congestive heart failure. Freiman & Murtaugh's study (1995) identifies a far higher rate of hospitalisation among the residents of nursing homes, and from nursing homes with lower rates of reimbursement.

Despite the very large numbers of frail elderly people in long-term care in the UK, there has been little research into quality of health-care (Turrell *et al.* 1998). The only routine healthcare data kept centrally on residents of homes are hospital admissions data. For this reason, we decided a starting point for our analysis would be to look at the use of hospital resources by long-term care residents and the reasons for admission.

Objectives of the study

1 To compare emergency hospitalisation rates by cause of admission, hospital death and hospital length of stay for residents from nursing and residential care homes with those in the community aged 65 and over in one London Health Authority, Merton, Sutton and Wandsworth (MSW).
2 To describe trends in acute admissions from nursing and residential care.

Methods

1) Numerators: emergency hospital admissions

In the UK all hospital admissions to NHS hospitals are recorded as part of a national contract minimum data set (NHS MDS) (Majeed 1998). Although local hospital providers hold a complete set of patient details, national returns are anonymised. Hospital admissions data were requested for all residents aged 65 and over in the local health district for financial year 1996/97. (An admission is identified as the first finished consultant episode (FCE) in a spell).

We had hoped to use the source of admission code (code 54 – 'Nursing home, residential care home or group home run by the NHS', or code 89 – 'other, non NHS hospital, nursing home, healthcare or residential institution') to draw down the subset of admissions from care homes. However, of the 16 086 emergency admissions identified for this age group, only 11 admissions could be identified in this way. We took the seven-digit postcode data of each nursing and residential home in MSW and linked it to the postcode field of the acute emergency hospital admissions extract (1235 admissions). (Postcodes were 100% completed in both datasets).

Because care homes are only eligible for a unique postcode where they have 50 items or more of mail a day (large users) we asked the customer services department at the Royal Mail Address Management Centre to analyse postcodes of all nursing and residential care homes in MSW to obtain the number of shared delivery points. Ninety-three per cent of homes did not have a unique postcode.

Until July 1998, the local clearing service for the admitted patient contract data set in MSW and throughout the west of South Thames included a 'Patient Enquiry Module' that enabled access to individual PAS records (Patient Administration System) by hospital number. By this method we matched the address of each emergency admission episode to the postcode of each home manually. Of the 1235 admissions matched by postcode, 847 were actually from a nursing or residential home (69%). This left a remainder of 15 239 emergency admissions from the community. Figure 1 describes this part of the methodology.

Exclusions: Ten of the 1235 admission episodes matched by postcode had no address recorded on PAS (where the provider was outside South Thames).

2) Denominator: numbers of people in nursing and residential care homes

The data sources for this section include: Korner returns for MSW for financial year 1996/97; Nursing Homes K036 return (subsequently replaced by RH(N) return); and the Residential Home RA return (Forms A, B and C).

Of the 232 homes in MSW, there were 55 nursing homes and 177 residential homes, of which eight were dual registered. To obtain numbers of residents (as opposed to places) we requested data from the individual
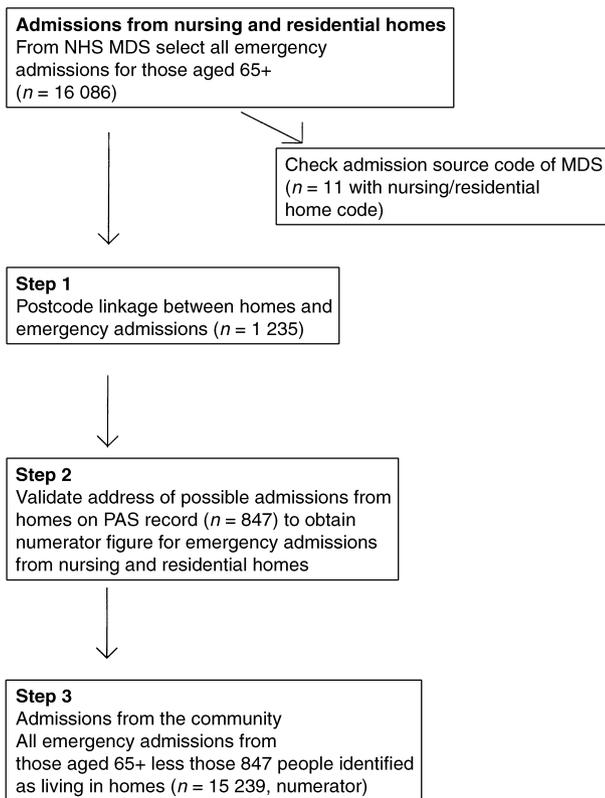
Admissions from nursing and residential homes
From NHS MDS select all emergency
admissions for those aged 65+
(*n* = 16 086)

Check admission source code of MDS
(*n* = 11 with nursing/residential
home code)

Step 1
Postcode linkage between homes and
emergency admissions (*n* = 1 235)

Step 2
Validate address of possible admissions from
homes on PAS record (*n* = 847) to obtain
numerator figure for emergency admissions
from nursing and residential homes

Step 3
Admissions from the community
All emergency admissions from
those aged 65+ less those 847 people identified
as living in homes (*n* = 15 239, numerator)

Figure 1 Methods: identifying emergency admissions from nursing and residential homes and from the community for 1 year.

returns collected by the Department of Health for MSW (K036 for nursing homes and RA for Residential Accommodation Statistics). As data collection is not 100% complete for the whole district, the Department of Health sent two files containing residential accommodation statistics for 1996 and 1997, respectively, and one file for 1997 nursing home statistics. Nursing home data recorded on the K036 represent a 'snapshot' in time either at 31 March or at the date of inspection between 1 October and 31 March. Residential home data collected on the RA represent a 'snapshot' at 31 March. Occupancy figures were available for 53 nursing homes (two missing) but was less well recorded in the residential statistics. So, to obtain the numbers of people aged 65+ in a residential home at one point in time, first, the number of residents in this age group in the 1997 file was recorded (for 116 homes), then where there were omissions, the figure in the 1996 file was used (for 40 homes). This left 21 homes where no figure was available. We telephoned each of these, plus the two nursing homes to obtain the number of residents. Fifty-eight residential homes had no one aged over 65. This process identified 3204 elderly people living in nursing and

residential care homes at any one time. However this 'snapshot' date differed as described according to the data source used.

Numbers of people in the community
The resident population aged 65 and over in MSW was estimated at 83 606 (ONS mid-year estimate for 1996). After subtracting those 3204 people identified in care homes, this left 80 402 people in the community.

Analysis

1 Hospital admission rates by age (65+) were calculated, and relative risks derived for residents of nursing and residential care homes compared with the community. Relative risks were calculated using EpiInfo.
2 Admission rates by main causes for each group were compared (by analysis of primary diagnosis).
3 Hospital mortality rates for emergency admissions from nursing and residential care homes and the community were calculated and compared, as were the relative risks of hospital death.
4 Hospital length of stay was compared for the two groups. The Mann–Whitney *U*-test was used to test for statistical difference after all hospital deaths were excluded.
5 Seasonal trends in hospital admissions from nursing and residential homes were charted.

Results

Numbers and rates of emergency admissions for those aged 65 and over from nursing and residential homes and from the community

The hospital admission rate from nursing and residential homes was 26.4 per 100 population (847 admissions) compared with 18.9 per 100 population (15 239 admissions from the community) (Table 1). This gives a relative risk of 1.39 of being admitted from a home (95% CI 1.31–1.48). There is a far higher admission rate from residential homes compared with nursing and dual registered homes (31.2 per 100 population residential homes, 22.3 nursing homes and 22.0 from dual registered homes).

Comparison of the main causes of emergency admissions for residents of homes and the community

Table 2 describes rates per 100 population for the main causes of emergency admission. Emergency admissions due to fractures and injuries are notably higher amongst

Table 1 Numbers and rates of emergency admissions for those aged 65 and over for 1 year

Place of residence	Number of emergency admissions by place of residence	Population over 65 by place of residence	Admission rate per 100 population	Statistical difference of admission from homes compared with general population P-value
Nursing homes	253	1 132	22.34	$P = 0.0043$
Residential homes	469	1 504	31.18	$P < 0.0001$
Dual registered homes	125	568	22.01	$P = 0.0725$
Sub total nursing and residential homes	847	3 204	26.43	$P < 0.0001$
General population	15 239	80 402	18.95	
Total emergency admissions	16 086	83 606	19.24	

Table 2 Main causes of emergency admission, and relative risk for those aged 65 and over for 1 year

Cause of admission (ICD 10 code)	Emergency admissions from nursing and residential homes. Rate per 100 population ($n = 3204$)	Emergency admissions from the community. Rate per 100 population ($n = 80 402$)	Relative risk of admission from care home compared with the community (95% CIs)
All diagnoses	26.44 (847)	18.95 (15 239)	1.39 (1.31–1.48)
Diseases of the respiratory system (J00-J99)	4.99 (160)	2.65 (2135)	1.88 (1.61–2.20)
All injuries (S00-S99)	4.08 (131)	1.52 (1225)	2.68 (2.25–3.20)
Symptoms not classified elsewhere (R00-R99)	3.21 (103)	3.00 (2416)	1.07 (0.88–1.30)
Diseases of the digestive system (K00-K93)	2.68 (86)	1.62 (1301)	1.66 (1.34–2.06)
Fracture neck of femur (S720-S729)	2.65 (85)	0.67 (539)	3.96 (3.16–4.96)
Heart failure, IHD, angina (I20-I29 and I50-I59)	2.09 (67)	2.46 (1981)	0.85 (0.67–1.08)
All injuries excluding femur	1.43 (46)	0.85 (686)	1.68 (1.25–2.26)
Stroke (I64)	1.27 (41)	0.63 (510)	2.02 (1.47–2.77)
Diseases of skin (L00-L99)	0.62 (20)	0.33 (269)	1.87 (1.19–2.93)
Admissions ending in hospital death	7.17 (230)	2.78 (2234)	2.58 (2.27–2.95)
Admissions ending in hospital death in first 48 hours	2.71 (87)	0.74 (599)	3.64 (2.92–4.55)

those from nursing and residential homes compared with those from the community. The relative risk of admission for fracture of neck of femur was 3.96, for all injuries 2.68 (which includes fracture of neck of femur) and for diseases of the respiratory system 1.88 (all $P < 0.0001$).

Comparison between emergency admissions from nursing and from residential homes by cause

Table 3 profiles the main causes of admission as a rate per 100 population for nursing and dual, and residential homes, respectively. The identified main causes of hospital admission were all higher for the residential group with the exception of stroke and respiratory system diagnoses.

Mortality

Hospital death rates
The relative risk of hospital death was 2.58 for admissions from nursing and residential homes, and 3.64 for death in the first 48 hours of a hospital stay (Table 2). The causes of admission where hospital stay ended in death were similar in each group. However, those that died following admission from a nursing or residential home tended to be in the older age groups. Sixty-three per cent of hospital deaths from homes were aged over 85 (144) compared with 36% (805) from the community.

Death rates in emergency admissions from nursing homes compared with residential homes
Hospital death rates for admissions from residential homes were higher than from nursing and dual

Table 3 Main causes of admission and relative risk for residents aged 65 and over from nursing and dual registered homes, and residential homes for 1 year

Cause of admission (ICD 10 code)	Emergency admissions from nursing and dual registered homes. Rate per 100 population (n = 1700)	Emergency admissions from residential homes. Rate per 100 population (n = 1504)	Relative risk of admission from nursing and dual home compared with residential home (95% CIs)
Diseases of the digestive system (K00-K93)	2.05 (35)	3.39 (51)	0.61 (0.40–0.93)
Fracture of neck of femur (S720-S729)	2.58 (44)	2.72 (41)	0.95 (0.62–1.44)
Heart failure, IHD, Angina (ICD I20-I29 and I50-I59)	1.64 (28)	2.59 (39)	0.64 (0.39–1.03)
All injuries (S00-S99)	3.88 (66)	4.32 (65)	0.81 (0.46–1.44)
All injuries excluding femur	1.29 (22)	1.60 (24)	0.81 (0.46–1.44)
Diseases of the respiratory system (J00-J99)	17.2 (65)	6.32 (95)	0.61 (0.44–0.82)
Symptoms not classified elsewhere (R00-R99)*	2.53 (43)	3.99 (60)	0.63 (0.43–0.93)
Stroke (I64)	5.0 (19)	1.46 (22)	0.76 (0.42–1.41)
Admissions ending in hospital death	5.7 (97)	8.84 (133)	0.65 (0.50–0.83)
Admissions ending in hospital death in first 48 hours	2.64 (45)	2.79 (42)	0.95 (0.63–1.44)

* Most of the symptoms not classified elsewhere relate to general, digestive and circulatory system diagnoses.

Table 4 Hospital length of stay for emergency admissions for those aged 65 and over from nursing and residential homes and from the community

Cause of admission (ICD 10 code)	Emergency admissions from nursing and residential homes: length of stay				Emergency admissions from the community: length of stay				Statistical difference of length of stay between groups
	Median	(SD)	LQ	UQ	Median	(SD)	LQ	UQ	P-value
Diseases of the respiratory system (ICD J00-J99)	10	(15.11)	6	17	9	(14.13)	6	15	P = 0.376
All injuries (ICD S00-S99)	12	(25.11)	8	20	13	(25.07)	5	27	P = 0.925
Diseases of the digestive system (ICD K00-K93)	9	(12.46)	4	15	7	(17.52)	4	13	P = 0.351
Fracture neck of femur (ICD S720-S729)	15	(28.65)	10	22	20	(26.76)	13	37	P = 0.003
Heart failure, IHD, angina (ICD I20-I29 and I50-I59)	7	(13.85)	5	12	9	(12.86)	5	15	P = 0.392
Stroke (ICD I64)	21	(26.03)	12	45	31	(43.21)	14	59	P = 0.329
Emergency admissions	9	(22.69)	5	18	9	(22.60)	5	18	P = 0.154

Mann–Whitney U-test used, excluding all admissions ending in hospital death.

registered homes (8.84 compared with 5.7 per 100 population). However, there was little difference between rates when death took place within the first 48 hours of a stay (Table 3).

Comparison of hospital length of stay for each group

After excluding stays ending in hospital death, length of stay (time between admission and discharge) was compared for emergency admissions between the nursing and residential sector, and the community. There was no significant difference, except for admissions for fracture of neck of femur, which had a shorter stay for residents from care homes (P = 0.003) (Table 4).

Seasonal trends in emergency hospital admission among nursing homes and residential homes

Emergency admissions from nursing and residential homes were plotted by week of the year to identify
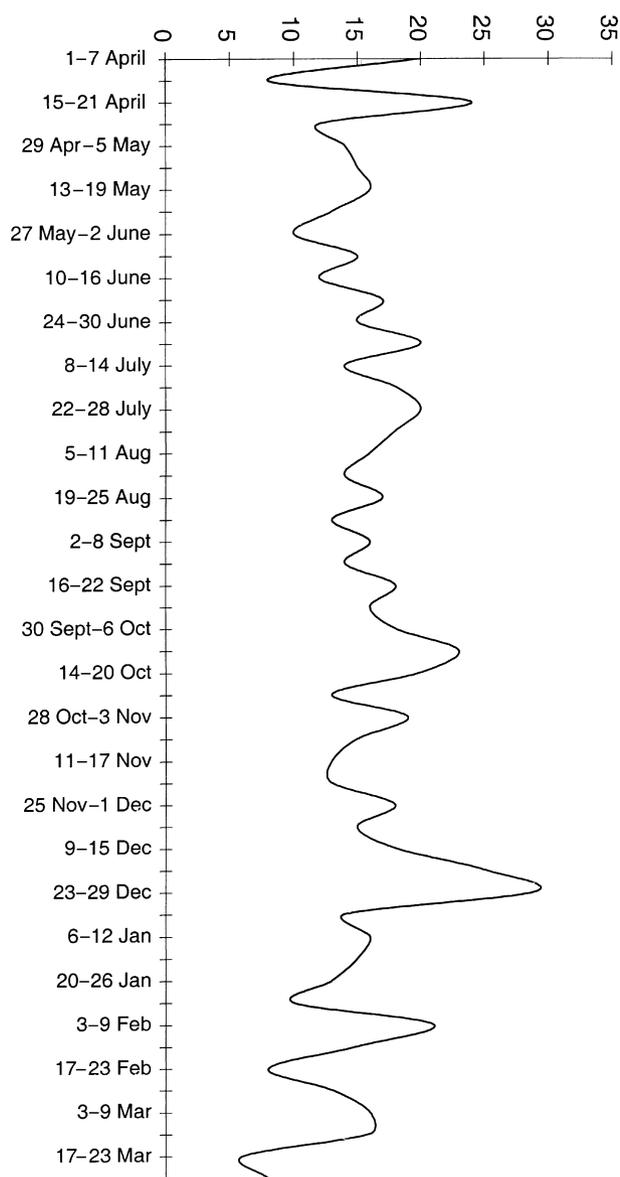
Figure 2 Number of admissions from nursing and residential homes week by week in financial year 1996–1997.

discernible peaks in admission. There was some increase during holiday periods, particularly over Christmas (Fig. 2).

Discussion

This is the only population-based UK study to analyse the use of the acute hospital sector by residents of care homes for emergency admission. The main results were as follows:

Our study shows higher emergency admission rates and hospital death rates among people from nursing and residential care homes. In particular, we note the far higher emergency admission rate from residential homes compared with either nursing homes or dual registered homes (1.4 times higher). Where the level of nursing input increases, so admissions to hospital fall. It is interesting to note that in the dual registered homes which are staffed by qualified nursing staff, admission rates are similar to those from nursing homes. This demonstrates the importance of nursing input and suggests a relationship between hospital admissions and levels of nursing care. US studies have described the importance of studying staffing and its relationship to quality of care in nursing homes. Harrington *et al.* (1997) discuss how little research has been conducted on the amount of time and the appropriate types of staff needed to provide high quality care to residents with differing levels and types of medical, functional, and psychosocial needs.

The changing needs of residents over time should also be considered. In this country, results from the National Audit of Nursing Home Placements undertaken in 1995–98 (St. George's Hospital Medical School 1999) indicate that the care needs of 26% of nursing home residents had risen since admission (using Barthel Score analysis). It recommends that regular multidisciplinary reviews take place not less than every 6 months in order to detect changing levels of dependency and to address any identified unmet needs.

There was a different pattern of inpatient admissions from nursing and residential homes, compared to the general population. In particular, we note the three-fold increased risk of admission for falls and injuries. Ray *et al.* (1997) describe how falls by nursing home residents in the United States are twice the rate for persons dwelling in the community, but that outcomes can be substantially improved through structured safety programmes, incorporating a variety of measures including environmental considerations, repair of furniture, well-fitting shoes, avoidance of clutter, maintenance of equipment, psychotropic drug recommendations, increased observation of residents and assistance with transfer. Rubenstein *et al.* (1996, p. 881) draw similar conclusions:

that the most successful strategies for fall prevention take into account the multifactorial causes of falls, and include interventions to improve strength and functional status, reduce environmental hazards, and allow staff to identify and monitor high-risk residents.

An earlier study by Bowling *et al.* (1992) of accidents among elderly residents in NHS nursing homes and in a long-stay NHS hospital ward reported respondents randomised to NHS nursing homes experienced a higher accident rate, as well as an earlier decline in

functional and mental ability. There were associations of accident risk with medical diagnosis and medication taking. Accidents most frequently took place in bedrooms and toilet when unsupervised.

There was little difference for hospital length of stay between the two groups, except for fracture of neck of femur where hospital spell was shorter for residents of homes. The study identified an increased risk of hospital deaths occurring within 48 hours from residents of homes. We were unable to examine the appropriateness or the avoidability of admission, but such findings highlight the need for more research in this area, as well as for systematic monitoring of admissions and studies of risk factors and intervention strategies required.

Our study identified the difficulties in monitoring admissions from nursing and residential care homes due to data coding problems. Department of Health returns record numbers of places and numbers of residents by age group but these are not always complete. Also, although the NHS MDS allows for coding of admissions from nursing and residential care homes, these codes are not used routinely. Unless this key data requirement is addressed, monitoring of hospital use by residents from homes will be extremely difficult if not impossible without expensive manual trawls of the data.

Such studies also require reliable and complete data from the Department of Health on residential and nursing home numbers. In this study nursing home returns were fairly complete, but much less so for residential homes, which added to difficulties in calculating our 'denominator' data. A greater age breakdown would also have been needed to calculate age-specific rates.

Although the reasons for the different characteristics of the two groups cannot be concluded from a study such as this, which draws on secondary sources of data, it does serve to illustrate how little has been done to investigate the acute care needs and the use of acute services by residents living in nursing and residential care homes. The National Audit cites stroke, illness, confusion, immobility and falls as accounting for over 80% of diagnoses thought to be most contributory to the need for long-term care (St. George's Hospital Medical School 1999). Therefore, admission to a nursing home is made on the basis that such a setting will be able to meet the needs of this frail elderly population. There is a perception that once placed, elderly people do not leave their nursing and residential homes, but this study shows that emergency hospital admissions from care homes are a significant cause of acute hospital admission. We also observed a slight increase in admissions over the holiday period, which is the traditional time for 'bed blocking' due to failures in the discharge process. The extent to which admissions from nursing homes

and residential care homes are contributing to the problem has not so far been evaluated.

A prospective study is required to ascertain to what extent admissions from care homes are avoidable and appropriate and the risk factors for admission. But the Department of Health needs to ensure that its information strategy captures the significant numbers of frail, elderly people in long-term care and how their healthcare needs are being met.

Acknowledgements

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