An edited version of this article has been published as: Jones R (2013) Financial risk and volatile elderly diagnoses. ***British Journal of Healthcare Management*** 19(2): 94-96. Please use this to cite.

# Financial risk and volatile elderly diagnoses

**Dr Rod Jones (ACMA, CGMA)**
**Statistical Advisor**
**Healthcare Analysis & Forecasting**
**hcaf_rod@yahoo.co.uk**

**For further articles in this series please go to: www.hcaf.biz**
**The published version is available at www.bjhcm.co.uk or via Athens.**

A series of articles commencing in the May 2012 edition of BJHCM has been investigating the 'real world' financial risk in health care purchasing (Jones 2012a-g). This series has been called 'real world' because the majority of financial risk literature has calculated risk using computer simulation or random samples. This ignores the impact of the environment on the volatility in admissions, attendances and costs and thereby underestimates the full extent of risk. This series has identified the fact that end-of-life events are usually the most environment sensitive and hence the most volatile (Jones 2012c,g).

In 2010 some 60% of male and 74% of female deaths in England occurred in the 75+ age group and this age group accounts for around 25% of all age admissions but only represents 8% of the population. Due to the generally higher length of stay for the elderly total costs for this group will account for >30% of the acute and mental health budget. Given these facts this group will make the biggest contribution to the marginal changes in cost from one year to the next.

With this in mind, Table 1, explores the 50 primary diagnoses for those aged 75+ showing the highest average intrinsic volatility. Four calculations of volatility are given, two pairs covering volatility with and without adjustment for growth over time and re-calculation of these with adjustment for number of admissions (smaller admissions have higher statistical volatility) to give the intrinsic volatility (calculated at 1,000 admissions). The first column in each pair gives the volatility impact on commissioning while the size-adjusted volatility allows identification of those diagnoses with the highest *intrinsic* sensitivity to the environment. These top 50 diagnoses (out of 750 possible diagnoses with more than 100 admissions per annum in England) account for 40% of all admissions for this age group while the top 110 diagnoses (with intrinsic volatility >10%) account for 72% of all admissions. By way of contrast the 50 diagnoses with the lowest intrinsic volatility only account for 1% of admissions, i.e. the overall risk profile is skewed toward the high volatility/high volume diagnoses.

An edited version of this article has been published as: Jones R (2013) Financial risk and volatile elderly diagnoses. ***British Journal of Healthcare Management*** 19(2): 94-96. Please use this to cite.

## Table 1: Top 50 highest *intrinsic* volatility diagnoses for age 75+ admissions

| ICD | Description of primary diagnosis | Average Episodes | Not growth adjusted | | Growth adjusted | |
|---|---|---|---|---|---|---|
| | | | Raw | Intrinsic | Raw | Intrinsic |
| A04 | Other bacterial intestinal infections | 8,119 | 16% | 44% | 6% | 17% |
| A08 | Viral and other specified intestinal infections | 4,597 | 14% | 30% | 9% | 19% |
| C44 | Other malignant neoplasms of skin | 53,920 | 7% | 48% | 2% | 16% |
| D12 | Benign neoplasm of colon/rectum/anus | 14,454 | 9% | 33% | 4% | 16% |
| D64 | Other anaemias | 37,861 | 5% | 29% | 2% | 14% |
| F99 | Mental disorder not otherwise specified | 558 | 48% | 36% | 40% | 30% |
| H25 | Senile cataract | 68,878 | 6% | 53% | 4% | 31% |
| H26 | Other cataract | 132,322 | 5% | 59% | 2% | 23% |
| H35 | Other retinal disorders | 50,198 | 13% | 95% | 4% | 27% |
| H54 | Blindness and low vision | 318 | 38% | 21% | 32% | 18% |
| H59 | Post procedural disorders of eye and adnexa | 426 | 29% | 19% | 23% | 15% |
| H61 | Other disorders of external ear | 1,056 | 17% | 17% | 14% | 15% |
| I12 | Hypertensive renal disease | 12,925 | 17% | 61% | 10% | 35% |
| I21 | Acute myocardial infarction | 42,776 | 5% | 32% | 2% | 15% |
| I24 | Other acute ischaemic heart diseases | 3,051 | 16% | 27% | 9% | 16% |
| I50 | Heart failure | 82,052 | 3% | 27% | 2% | 15% |
| I63 | Cerebral infarction | 68,428 | 7% | 61% | 2% | 20% |
| I64 | Stroke (type not specified) | 16,761 | 12% | 47% | 4% | 15% |
| J11 | Influenza (virus not identified) | 116 | 53% | 18% | 53% | 18% |
| J18 | Pneumonia organism unspecified | 160,401 | 8% | 104% | 3% | 36% |
| J22 | Unspecified acute lower respiratory infection | 57,882 | 7% | 56% | 6% | 44% |
| J44 | Other chronic obstructive pulmonary disease | 85,632 | 5% | 43% | 3% | 31% |
| K52 | Other non-infective gastroenteritis and colitis | 39,914 | 7% | 42% | 3% | 18% |
| K63 | Other diseases of intestine | 13,860 | 11% | 40% | 4% | 14% |
| M79 | Other soft tissue disorders | 24,376 | 8% | 40% | 4% | 19% |
| N03 | Chronic nephritic syndrome | 1,211 | 25% | 28% | 21% | 23% |
| N18 | Chronic renal failure | 13,270 | 15% | 56% | 13% | 46% |
| N39 | Other disorders of urinary system | 149,049 | 9% | 105% | 1% | 17% |
| R06 | Abnormalities of breathing | 26,816 | 7% | 36% | 3% | 14% |
| R07 | Pain in throat and chest | 71,238 | 6% | 52% | 2% | 15% |
| R26 | Abnormalities of gait and mobility | 6,826 | 11% | 29% | 9% | 24% |
| R41 | Symptoms & signs - cognitive function | 31,261 | 7% | 39% | 3% | 14% |
| R53 | Malaise and fatigue | 9,612 | 8% | 26% | 5% | 15% |
| R54 | Senility | 64,521 | 6% | 52% | 3% | 22% |
| R55 | Syncope and collapse | 61,670 | 6% | 45% | 2% | 17% |
| R68 | Other general symptoms and signs | 910 | 26% | 25% | 26% | 25% |
| R69 | Unknown and unspecified causes of morbidity | 31,121 | 25% | 139% | 21% | 116% |
| S01 | Open wound of head | 22,647 | 9% | 44% | 3% | 15% |
| S72 | Fracture of femur | 84,320 | 3% | 29% | 2% | 16% |
| Z00 | General examination | 208 | 78% | 36% | 74% | 34% |
| Z01 | Special examination | 323 | 35% | 20% | 25% | 14% |
| Z03 | Evaluation for suspected diseases | 5,839 | 18% | 43% | 16% | 38% |
| Z04 | Examination and observation for other reasons | 1,004 | 38% | 38% | 31% | 31% |
| Z50 | Care involving use of rehabilitation procedures | 2,246 | 40% | 61% | 26% | 39% |
| Z51 | Other medical care | 163 | 80% | 32% | 67% | 27% |
| Z73 | Problems related to life-management difficulty | 5,397 | 23% | 55% | 16% | 36% |
| Z74 | Problems related to care-provider dependency | 281 | 65% | 35% | 47% | 25% |
| Z75 | Problems related to medical facilities | 1,361 | 40% | 47% | 15% | 18% |
| Z76 | Persons encountering health services | 123 | 73% | 26% | 49% | 17% |
| Z85 | Personal history of malignant neoplasm | 138 | 62% | 23% | 45% | 17% |

Footnote: Fourteen years of data from http://www.hesonline.nhs.uk/Ease/servlet/ContentServer?siteID=1937&categoryID=203 and uses the 3 digit ICD-10 primary diagnosis for both elective and emergency episodes covering English residents. Calculation of year to year volatility and adjustment for growth is per Jones (2012g). Some 750 diagnoses with more than 100 admissions per annum were analysed for volatility. Average episodes (3rd column) were calculated over the period 2009/10 to 2011/12. Intrinsic volatility has been scaled to that arising for 1,000 admissions per annum, i.e. observed volatility times the square root of (1,000/average admissions).

An edited version of this article has been published as: Jones R (2013) Financial risk and volatile elderly diagnoses. ***British Journal of Healthcare Management*** 19(2): 94-96. Please use this to cite.

Highest intrinsic volatility is for R69 (unknown causes of morbidity) and this arises from long-term cyclic behaviour in admissions for this diagnosis, compounded by points of high death within the cycle (Jones 2012f). Next highest is for chronic renal failure which can be exacerbated by infections, septicaemia and other causes all of which are sporadic in nature. Volatility at local level will of course be far higher than the figures in Table 1 which are from national totals and averages.

As a general overview the volatilities are generally high indicating that managing the budget for the 75+ group will be exceedingly difficult and are spread over a wide range of body systems as is expected of mosaic ageing, i.e. death and acute illness arises from the weakest point in an overall ageing body system (Walker & Herndon 2010). Note that even cataract surgery (ICD codes H25, H26) is volatile and this probably arises out of intrinsically high volatility in deaths (Jones 2012c), i.e. in some years larger numbers of potential lens recipients die before they are even referred.

What are CCG's to learn from this information? Firstly changing the organisational badge from PCT to CCG makes no difference to intrinsic volatility. While it is highly likely that CCGs will be far more effective at implementing cost saving measures this merely reduces the total cost but rarely changes the intrinsic volatility which depends on the interaction between human physiology and health with the environment (which includes infectious outbreaks). At the end of the day the process of budgeting assumes that costs are fairly stable; which is in contradiction to reality. Indeed it has been observed from simple computer simulation (ignoring the impact of environment on volatility) that even large organisations can fall into financial difficulty due to basic statistical fluctuation in activity and case mix (Jones 2009a). Finally, high intrinsic volatility implies difficulty in forecasting future activity and costs and hence budgets and financial management become less certain, and even open to manipulation to give projections which are over optimistic (Jones 2002).

Across England GPs are working with secondary care providers in Integrated Care pilots trying to find alternatives to admission for our elderly population. While such laudable efforts will indeed achieve national cost savings which will benefit the DH and the government, what has not been pointed out is that this amounts to a transfer of volatility (risk) out of secondary care to primary care. Hence at the smaller local CCG level the volatility re-emerges as uncertain demand for primary care staffing and related costs (see Jones 2011 and 2013a for an analysis of long term volatility) and at local level suffers from a distinct lack of economy of scale (Jones 2002). Acute unit costs will likewise exhibit a compensating increase as the complexity of those patients who do get admitted will rise and fixed costs will be distributed across a smaller activity base. If the government and its advisors are aware of such factors they have certainly kept them private.

By implication budgets need to be managed in a flexible way, measures need to be taken to share financial risk and surpluses need to be retained for use in adverse years (Jones 2008a,b, 2012e). There is nothing to be gained by denying the reality of how costs 'work'

An edited version of this article has been published as: Jones R (2013) Financial risk and volatile elderly diagnoses. ***British Journal of Healthcare Management*** 19(2): 94-96. Please use this to cite.

and ignoring the required remedies. This appears to be the root cause behind the failure of the Department of Health to correctly diagnose what at first appeared to be 'financial failure' in the former PCTs. As yet there is no sign that the Commissioning Board has learned any lessons nor appears to have any appetite for new approaches (Jones 2013b). It would seem that it is up to GP commissioners to make their voice heard before it is too late, perhaps via their professional bodies, the RCGP and the BMA.

**References**

European Observatory on Health Systems and Policies (2012) Home care across Europe: Current structure and future challenges. Eds. Genet N, Boerma W, Kroneman W, et al. World Health Organisation, Copenhagen, Denmark. http://www.euro.who.int/__data/assets/pdf_file/0008/181799/e96757.pdf

Jones R (2002) Financial and operational risk in health care provision and commissioning. Healthcare Analysis and Forecasting, Camberley http://www.hcaf.biz/Financial%20Risk/Variation_healthcare.pdf

Jones R (2008a) Financial risk in practice based commissioning. BJHCM 14(5): 199-204.

Jones R (2008b) Financial risk in health purchasing Risk pools. BJHCM 14(6): 240-245.

Jones R (2011) Volatility in bed occupancy for emergency admissions. BJHCM 17(9): 424-430.

Jones R (2012a) Volatile inpatient costs and implications to CCG financial stability. BJHCM 18(5): 251-258.

Jones R (2012b) Cancer care and volatility in commissioning. BJHCM 18(6): 315-324.

Jones R (2012c) End of life care and volatility in costs. BJHCM 18(7): 374-381.

Jones R (2012d) Age and financial risk in healthcare costs. BJHCM 18(7): 388-389.

Jones R (2012e) High risk categories and risk pooling in healthcare costs. BJHCM 18(8): 430-435.

Jones R (2012f) Diagnoses, deaths and infectious outbreaks. British Journal of Healthcare Management 18(10): 539-548.

Jones R (2012g) Financial risk in GP commissioning: lessons from Medicare. BJHCM 18(12): 656-657.

Jones R (2013a) A fundamental flaw in person-based funding. BJHCM 19(1): 32-38.

Jones R (2013b) Response to: "Incentives for GPs to cut emergency admissions could lead to "target culture," warns GP leader". *BMJ 346:f312* http://www.bmj.com/content/346/bmj.f312/rr/625652

Walker L, Herndon J (2010) Mosaic aging. Medical Hypotheses 74(6): 1048-1051.