NK Seventh Year - where to next? Journey over, another begins

The beauty of the mathematical models of flow of patients through health and social care systems, which have followed the seminal work of Gary Harrison in Charleston, SC and Sally McClean in Coleraine, NI, is that they bring transparency to the process of inpatient care. No longer is it good enough to compare and contrast the process of hospital inpatient care, to plan and to set targets simply in terms of numbers of beds allocated and occupied, admissions and discharges, and length of stay at discharge. For the needs of an ageing population are much more complex than that.

During the last twenty years, little by little and step by step, like a mushroom growing in the dark, others have joined in. Mathematically; Florin Gorunescu, Romania, Thierry Chaussalet, UK, Malcolm Faddy, Australia and Adele Marshall, Queens University Belfast. Computationally, Elia El-Darzi at Westminster. Organisationally, Mark Mackay in Adelaide; and Clinically, Brendon Rae, New Zealand have made major contributions.

So much so that we can safely say, we have the tools, and the know how to measure and model the time sequence of care in constantly moving systems. For example, by combining snap-shots in time present (bed census data) with past patterns of resource use (cohort data) Thierry Chaussalet’s group at the University of Westminster are leading the field in providing a decision support tool, which enables purchasers of residential and nursing home, Local Government and Primary Care Trusts, to estimate their committed cost of care in publicly funded placements.

One stage is over, another begins. Early concepts of measuring and modelling time came from one of my heroes, PD Ouspensky, a Russian Mathematician Philosopher, author of a New Model of the Universe. Now mathematically, we can measure and model the time dimensions (phases) of health and social care, and clinically, using destination at discharge and percentile distributions of length of stay, we can explore and explain how and why staff learnt behaviour and discharge destination interact to explain differences in the outcome of care.

However, clinically and practically, without visiting the hospitals and homes, no-one knows why, where and when differences in outcome occur, while medically staff are doing the same thing. Witness to this I give you four snapshots of my study.

Basic statistics. The room height is 10 feet, width 8 feet, length 12 feet. The left picture, is a view to the street. Focusing on the computer, you may or may not see the glider in the upper left hand corner. And even if you did, and more importantly, you would not know why it flies there.

Looking behind me, the picture on the right, the red folders contain all publications 1969-2009. Clearly, I am not there. Which doesn’t indicate that I am not there. Indeed, bottom left, if this shows the back of the chair and not the front, someone with a black hat on could be sitting in the chair.

Finally, bottom right, there is a filing cabinet, two Chinese figures and a black painting, by Joseph, one of our 12 grandchildren, when he was eight. It’s the moon and an astronaut. No knowledge there about me, but guesses of what might be. Moreover, no knowledge of the nature of the rest of the house. But, I’ll let you into a secret - it doesn’t look at all like this - much more tidy, but that’s Gill’s territory.

‘Why this?’ you may ask. Well For twenty years, Gary and Sally, the lead mathematicians, have developed step-by-step, alone and with others a science base to underpin the planning of sustainable health and social care systems to meet the needs of an ageing population. Bringing transparency to the importance of symbiotic relationship between health and social care. Collaboration not competition.

The beauty of the mathematical and computational solutions is that they enable ‘What If’ optimisation of competing solutions of the outcome of change. However, there is a caveat, for, like the pictures in my study, they give information but no knowledge about the contents and purpose. Which is why the Nosokinetic, mathematical science base of medicine, now needs to be co-developed in association with the Art of care.
Insight from Australia

Short-term forecasting of emergency inpatient flow


Modelling three days daily data emergency admissions are largely random, hence unpredictable, whereas emergency occupancy can be forecasted, up to one week ahead, using a model combining regression and autoregressive integrated moving average (ARIMA) model, or a seasonal ARIMA model. Faced with variable admissions and occupancy, hospitals must prepare a reserve capacity of beds and staff. Their approach allows estimation of the required reserve capacity.

Myths of ideal hospital occupancy


Where did 85% come from? Horrocks (Age and Ageing 1986;15:321-342) from experience in geriatrics recommended it. And Bagust (BMJ 1993;319:155-8), using a simulation model and acute medical data, concluded that departments with more than 85% occupancy would experience difficulties. Since then 85% has become a management mantra. Yet, elementary queueing theory shows that a finite-capacity system with variable demand cannot sustain both full utilisation and full availability. So a single level of ideal or safe occupancy is too simplistic an interpretation and application of the underlying science. Authors argue that a specific study and action are necessary to understand and deal with the problems of long waiting lists and access block in any given health care facility. Editor Think about it—general medicine has an unconstrained bed allocation, with seasonal demand (need) and the shorter the length of stay is the greater the need for empty beds. More beds in winter fewer in summer.

Modelling the process of inpatient care and planning for the future

Reflecting on the way forward, my mind went backwards, to the days in the 80’s when we were struggling to understand the basic concepts underpinning the process of inpatient care. And I recalled a lunch time discussion with Dr (now Prof) Brian Livesley, who directed our thoughts to Catastrophe Theory and the work of Prof Rene Thom. The Figures come from theory and the work

See http://www.nosokinetics.org MD publication

To join or leave the mailing list http://www.jiscmail.ac.uk/lists/NOSOKINETICS-NEWSLETTER.html
Recent References relating to the use of modelling in clinical care.

At the December meeting of the UK Nosokinetics Group, to ease the task, it was decided that a more frequent publication, with notices of conferences and titles of publications in the literature would be helpful. Hence titles and details only.


Editors comment—if you would like attention to be drawn to your publications email

phmillard at tiscali.co.uk
Nosokinetics News is the newsletter of the UK Nosokinetics Group

Nosokinetics is the science / subject of measuring and modelling flow through health and social care systems. From the Greek, literally, *noso* (sickness) and *kinetics* (movement).

The group collaborates to organise conferences and disseminates news of our and others research and practical use of modelling to enhance decision making in health and social care systems.

**Officer of the Nosokinetics Group:**

**Chair:** Prof Sally McClean, *University of Ulster*

**Secretary:** Dr Adele Marshall, *Queen’s University*

**Treasurer:** Dr Thierry Chaussalet, *University of Westminster*

**Conference:** Dr Elia El-Darzi, *University of Westminster*

**Australian Rep.:** Dr Mark Mackay, *Dept. of Health, Adelaide*

**Editor:** Prof Peter Millard, (Emeritus) *St. George’s University of London*

To join or leave the mailing list [http://www.jiscmail.ac.uk/lists/NOSOKINETICS-NEWSLETTER.html](http://www.jiscmail.ac.uk/lists/NOSOKINETICS-NEWSLETTER.html)

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**Sixth IMA International Conference on Quantitative Modelling in the Management of Health Care**

Mary Ward House, London on 29 - 31 March 2010

Early-Bird registration deadline is 22 February.

Register online at [http://online ima.org.uk](http://online ima.org.uk)

**April**

2nd International Conference on Computer Supported Education

CSEDU 2010, to be held in Valencia, Spain (7 - 10 April, 2010) ([http://www.csedu.org](http://www.csedu.org))

**June**


University of Westminster, London, UK

Abstract deadline 14 February 2010


**Alios INFORMS 2010 Joint International Meeting**

June 6-9, Law School, University of Buenos Aires, Argentina.


Abstract extended to February 12

**July**

**Summer School (Biomedical and Health Informatics)**

Samos Island, Greece 19-24 July, 2010


**24TH EUROPEAN CONFERENCE ON OPERATIONAL RESEARCH (EURO XXIV)**

Lisbon, Portugal, July 11-14, 2010


**Greece** (a trio three in one)


Enase 2010 5th International Conference on Evaluation of Novel Approaches to Software Engineering


Paper submission March 2010,

ICETE 2010 7th International Joint Conference on e-Business and Telecommunications

July 26 - 28, 2010 Athens, Greece Website: [http://www.icete.org](http://www.icete.org)

Regular Paper submission: February 24, 2010

**Spain**

WCCI 2010 IEEE World Congress on Computational Intelligence

Computational Intelligence and Cyberinfrastructure for Complex System Modelling and Knowledge Discovery in Medical Informatics and e-Health”.

July 18-23 Barcelona, Spain Submission deadline extended until 7th February, 2010.


**Poland**

MI&E’10 Workshop on Medical Informatics and Engineering

At International Multiconference on Computer Science and Information Technology (IMCSIT), Wisla, Po-