Integrated Care Matters
Community Virtual Ward and Risk Prediction
Carewell: ICT Enabled Care
Knowledge Tree Branch
Community Virtual Ward

Health Service Executive Ireland (2016) A Community virtual ward [link]

This video provides information about the Community Virtual Ward, which aims to support older people with complex health and social care needs within the community.


This quantitative observational study was conducted to examine if a CVW model of care reduced unplanned hospital admissions and emergency department (ED) presentations in 54 patients over a 12-month period. The sign-rank test examined matched data on bed days, ED presentations, and unplanned hospital admissions pre- and post-CVW implementation. Other risk factors for admission to hospital were examined using the Mann–Whitney test pre- and post-CVW admission, including falls, living alone, and cognition. Correlations between hospital admission avoidances and unplanned hospital admissions and ED presentations were tested using Spearman’s p test.

There was a reduction in ED presentations post-CVW admission (P<0.001), and median unscheduled admissions were reduced (P=0.001). Those living alone had a lower number of ED presentations (median 0.5, interquartile range 0–1) prior to admission in comparison to those living with a caregiver, with no differences observed during admission to CVW. For those who experienced a fall during CVW admission, the odds ratio (OR) of requiring long-term care doubled for each extra fall (OR =2.24, 95% CI 1.11 to 4.52, P=0.025). Reduced cognition was associated with an increased risk of ED presentations (p=0.292, P<0.05) but not associated with increased risks of unplanned hospital admissions (p=0.09, P=0.546). There were no significant correlations seen between admission avoidance and the number of unplanned hospital admissions or ED presentations.

HSE Ireland (2017) Nora’s Story, depicting integrated care for older people [link]

Nora’s Story is a short video depicting how the Integrated Care Programme for Older Persons could provide person-centred co-ordinated care across health and social care services.

Care Inspectorate and Healthcare Improvement Scotland (2016) Services for older people in Argyll and Bute: Report of a joint inspection of health and social work services for older people [link]

Example of good practice – Virtual ward meetings

Virtual ward meetings had been established across all of the localities. This was a multi-agency meeting to review the needs of older people living in the community whose condition was causing concern, as well as individuals in hospital whose discharge was delayed. The meetings were led by healthcare staff and were attended by hospital and community social work services staff, community nurses, allied health professionals and
ward managers. These meetings were a good example of joint working. The remote geography of some of the region posed a barrier to effective liaison. However, we noted the wide use of technology to overcome this. We saw positive examples of teleconferencing being used to allow staff across the Partnership to interact. Overall, we were impressed by the collaborative and interagency approach to ensuring the delivery of the best possible care for older people.

Iriss (2014) The fully integrated world. [link]

It is impossible to predict the realities of 2025 because there are any number of social, political and economic factors that will impact on our trajectory over the coming decade. The Imaging the Future scenarios have been designed to help us think through some of these issues. It is a tool to get us discussing, arguing and debating the future of social services. They are provocative but also useful to guide difficult conversations around, for example, the role of professionals in 21st century, citizen rights and responsibilities, leadership and workforce planning. Virtual wards are suggested as being the norm within a holistic health and social care service in 2025.


The ageing British population is placing increased demands on the delivery of care in mainstream health-care institutions. While people are living longer, a significant percentage is also living with one or more long-term conditions. These issues, alongside continuing financial austerity measures, require a radical improvement in the care of patients away from hospitals. The Wyre Forest Clinical Commissioning Group introduced a virtual ward model for two main purposes: to save on spiralling costs of hospital admissions, and, secondly, to ensure the preferred wishes of most patients to be cared for and even die at home were achieved. This commentary describes how the virtual ward model was implemented and the impact of preventing unplanned emergency admissions to hospitals. The setting up of enhanced care services and virtual wards in one county is discussed, aiming to highlight success points and potential pitfalls to avoid. The results from the implementation of the virtual ward model show a significant reduction in emergency and avoidable patient admissions to hospital. The success of virtual wards is dependent on integrated working between different health-care disciplines.


High-cost healthcare users (HCUs) are a small proportion of the population who use a disproportionate amount of healthcare resources. Although the phenomenon occurs across the entire age spectrum, older adults represent the majority of HCUs. HCUs have drawn increasing attention internationally from clinicians, health policy-makers, and government administrators. Many experts have suggested that the short- and long-term sustainability of the healthcare system is threatened unless current approaches to the care and healthcare costs of this population are modified. Complex case management and care coordination
models are being implemented internationally to address HCUs despite a lack of strong evidence to support their effectiveness in improving clinical outcomes or savings in costs of care. We review what is known about HCUs and the available evidence for the effectiveness of interventions designed to manage their high and costly healthcare use.


Patients at high risk of emergency hospitalisation are particularly likely to experience fragmentation in care. The virtual ward model attempts to integrate health and social care by offering multidisciplinary case management to people at high predicted risk of unplanned hospitalisation. This study aimed to describe the care practice in three virtual ward sites in England and to explore how well each site had achieved meaningful integration. Case studies were conducted in Croydon, Devon and Wandsworth during 2011–2012, consisting of semi-structured interviews, workshops, and site visits. Different versions of the virtual wards intervention had been implemented in each site. In Croydon, multidisciplinary care had reverted back to one-to-one case management. The authors conclude that to integrate successfully, virtual ward projects should safeguard the multidisciplinary nature of the intervention, ensure the active involvement of General Practitioners, and establish feedback processes to monitor performance such as the number of professions represented at each team meeting.


Virtual wards (VWs) may be defined as services that provide “active treatment by health care professionals, in the patient’s home, of a condition that otherwise would require acute hospital in-patient care, always for a limited period”. This study aimed to assess the extent to which this form of multidisciplinary case management has led to changes in the use of health care and social care by patients at high predicted risk of future unplanned hospital admission. The authors also assessed the impact of the intervention on rates of accident and emergency attendance, social care provision, GP practice visits, and the use of community health services. They studied the “virtual ward” intervention at three sites - Croydon, Devon and Wandsworth - but most of the cases were from Croydon where the idea had originally been put into practice. The authors profiled the costs of setting up and running virtual wards and compared these to any changes observed in the utilisation of health and social care. Costs ranged from £3 to £17 per virtual ward patient per day; but the changes observed in health care and social care service use was insufficient to offset the costs of the intervention. They found that each of the study sites had implemented variants on the virtual ward model as originally described. Compared with matched controls, no evidence was found of a reduction in emergency hospital admissions for patients who received this type of care in the six months after starting the intervention. Nor was any evidence found of a reduction in ambulatory care sensitive hospital admissions in this period, or in mortality. However, the authors did observe a reduction in elective hospital admissions and in outpatient attendances in the six months after starting the intervention.
Croydon Primary Care Trust (PCT) has been piloting the practical use of the Combined Model on behalf of the King’s Fund and Health Dialog since May 2006. It has developed a package of care called virtual wards that it offers solely to people at highest predicted risk. This case study provides a clear overview and description of the intervention.


This was a retrospective cohort study of all patients ≥ 21 years of age, who were admitted to a tertiary hospital in Singapore from January 1, 2013 through May 31, 2015. Data were extracted from the hospital’s electronic health records. The outcome was defined as unplanned readmissions within 30 days of discharge from the index hospitalization. Candidate predictive variables were broadly grouped into five categories: Patient demographics, social determinants of health, past healthcare utilization, medical comorbidities, and markers of hospitalization severity. Multivariable logistic regression was used to predict the outcome, and receiver operating characteristic analysis was performed to compare our model with the LACE index. 74,102 cases were enrolled for analysis. Of these, 11,492 patient cases (15.5%) were readmitted within 30 days of discharge. A total of fifteen predictive variables were strongly associated with the risk of 30-day readmissions, including number of emergency department visits in the past 6 months, Charlson Comorbidity Index, markers of hospitalization severity such as ‘requiring inpatient dialysis during index admission, and ‘treatment with intravenous furosemide 40 milligrams or more’ during index admission. Our predictive model outperformed the LACE index by achieving larger area under the curve values: 0.78 (95% confidence interval [CI]: 0.77–0.79) versus 0.70 (95% CI: 0.69–0.71).


NHS Newham, Tower Hamlets and Waltham Forest CCGs, local authorities and providers are working together to integrate care across health and social care. The Integrated Care programme will empower patients to stay active, live independently and have a greater role in their care. This should reduce emergency admissions and use of residential care. See how it works in this animated video produced for the WELC Care Collaborative.

Sansoni, J et al. (2015) Targeting integrated care to those most likely to need frequent health care: a review of social and clinical risk factors. Sax Institute for the NSW Agency for Clinical Innovation [link]

This rapid review was commissioned by the NSW Agency for Clinical Innovation (ACI) and the Sax Institute in Australia to examine the evidence concerning social and clinical risk factors which may be significant predictors of both pre-hospital and hospital service utilisation. While the authors agree with ACI2 that no existing predictive risk stratification
model is currently suitable to the NSW context, they noted that there are a number of existing models that could potentially be adapted to fit this context. Thus, they feel that some of these models could be explored in more depth, including their suitability in the Australian context. There is now a wide variety of risk prediction models available, although all of them require further and ongoing validation. There is a need to consider the relative costs of model adaptation and development.

Sonola, L (2013) South Devon and Torbay Proactive case management using the community virtual ward and the Devon Predictive Model. King’s Fund [link]

This case study is part of a research project undertaken by The King’s Fund and funded by Aetna and the Aetna Foundation in the USA to compare five successful UK-based models of care co-ordination (see Appendix 1 for methods used to collect the study data). The aim of each case study has been to understand the strategies used to deliver care co-ordination effectively; examine barriers and facilitators to successful care co-ordination; isolate key markers for success for the practical application of the tools and techniques of care co-ordination; and to identify lessons in how care co-ordination can best be supported in terms of planning, organisation and leadership.


Rising unplanned hospital admissions are a problem in ageing populations worldwide. These admissions are associated with poor outcomes for older people, contribute to rising health care costs and impede the provision of planned care. Policy and practice in recent years has focused on identification of those at risk of unplanned admission and early intervention via a range of admission avoidance services. Despite this, unplanned admissions in older people continue to rise, and managing demand for unplanned care remains a priority. Questions remain about the risk factors for unplanned admission and the best approaches to identifying and intervening with those at risk. This review explores recent evidence on admission rates, risk factors for unplanned admission in older people, identification of those at highest risk and interventions to avert unplanned admission.

Zhou, H et al. (2016) Utility of models to predict 28-day or 30-day unplanned hospital readmissions: an updated systematic review. BMJ Open, 6, e011060 [link]

The purpose of this systematic review is to update previous systematic review of predictive models for 28-day or 30-day unplanned hospital readmissions. The authors conclude that the predictive models which focused on general medical condition-related unplanned hospital readmissions reported moderate discriminative ability. Two models for potentially preventable/avoidable readmissions showed high discriminative ability. This updated systematic review, however, found inconsistent performance across the included unique 73 risk predictive models. It is critical to define clearly the utilisation outcomes and the type of accessible data source before the selection of the predictive model. Rigorous validation of the predictive models with moderate-to-high discriminative ability is essential, especially for the two models for the potentially preventable/avoidable readmissions. Given the limited
available evidence, the development of a predictive model specifically for paediatric 28-day all-cause, unplanned hospital readmissions is a high priority.


Attendance at emergency departments and unplanned hospital readmissions are common for frail older patients after discharge from hospitals. A virtual ward service was piloted to deliver “hospital-at-home” services by community nurses and geriatricians to frail older patients immediately after their discharge from hospital to reduce emergency services utilization. This study examined the impacts of the virtual ward service on changes in the patients’ emergency attendance and medical readmissions, and their quality of life (QOL).

A matched-control quasi-experimental study was conducted at four hospitals, with three providing the virtual ward service (intervention) and one providing the usual community nursing care (control). Subjects in the intervention group were those who are at high risk of readmission and who are supported by home carers recruited from the three hospitals providing the virtual ward service. Matched control patients were those recruited from the hospital providing usual care. Outcome measures include emergency attendance and medical readmission in the past 90 days as identified from medical records, and patient-reported QOL as measured by the modified Quality-of-Life Concerns in the End of Life Questionnaire (Chinese version). Wilcoxon signed-rank tests compared the changes in the outcome variables between groups.

A total of 39 patients in each of the two groups were recruited. The virtual ward group showed a greater significant reduction in the number of unplanned emergency hospital readmissions (-1.41±1.23 versus -0.77±1.31; P=0.049) and a significant improvement in their overall QOL (n=18; 0.60±0.56 versus 0.07±0.56; P=0.02), but there was no significant difference in the number of emergency attendances (-1.51±1.25 versus -1.08±1.48; P=0.29). The study results support the effectiveness of the virtual ward service in reducing unplanned emergency medical readmissions and in improving the QOL in frail older patients after discharge.
Carewell: ICT Enabled Care

The CareWell Project pursued the delivery of integrated healthcare to frail elderly patients through comprehensive multidisciplinary programmes. ICTs facilitate the coordination and communication of healthcare professionals and support patient centred delivery of care at home. The project supported the integration of care in six European Regions and produced an animated video which illustrates key lessons from the three years of the project. The 12 minute video explains how integrated care services work, how they contribute to patient empowerment and how their broader implementation can be pursued. The video is split into three modules. The first follows a patient scenario. Mary, an elderly patient with multiple chronic diseases, makes the switch from usual to integrated care. Module 2 provides a theoretical approach to integrated care, explaining the relevant terms and concepts. Module 3 is a call for action addressed to policy makers who wish to become involved in enabling integrated care services in their region [link]

Rojahn, K et al. (2016) Remote Monitoring of Chronic Diseases: A Landscape Assessment of Policies in Four European Countries. PLOS ONE [link]

Remote monitoring (RM), the surveillance of device-transmitted outpatient data, is expected to enable better management of chronic diseases. Searches of the medical literature, the Internet, and Ministry of Health websites for the United Kingdom (UK), Germany, Italy, and Spain were performed in order to identify RM policies for chronic diseases, including end stage renal disease (ESRD), chronic pulmonary obstructive disease (COPD), diabetes, heart failure, and hypertension. Searches were first performed in Q1 2014 and updated in Q4 2015. In addition, in depth interviews were conducted with payers/policymakers in each country. Information was obtained on existing policies, disease areas and RM services covered and level of reimbursement, other incentives such as quality indicators, past/current assessments of RM technologies, diseases perceived to benefit most from RM, and concerns about RM. The study concludes that in the four European countries surveyed, RM has attracted considerable interest for its potential to increase the efficiency of healthcare for chronic diseases. Although rare at this moment, incentives to use RM technology are likely to increase as the evidence of clinical and/or economic benefit grows.


The first part of this report reviews technologies and trends that are already happening. This is moderated by how society will change, both in the way that it reacts to the technology, and in the way that its values change as a result of external factors such as the economic status of the country, the ability of the NHS and other organisations to deal with the needs of an ageing population, and various other events that can change attitudes either overnight or over the course of time. The second part draws on six vignettes (or case studies) as a way of helping us imagine how outcomes might be different depending on the kinds of technology and communication that are available. These case studies offer opportunities to consider. The resource discusses the use of virtual wards.