



CGS · SCG  
CANADIAN GERIATRICS SOCIETY  
LA SOCIÉTÉ CANADIENNE DE GÉRIATRIE

**Roger Y. Wong,**  
**BMSc, MD, FRCPC, FACP,**  
**FCaHS**

*Executive Associate Dean  
(Education) and Clinical  
Professor of Geriatric  
Medicine, Faculty of  
Medicine, University of  
British Columbia,  
Vancouver, Canada*

**Jay Banerjee,**  
**MBBS, MSc, FRCS, FRCM**

*Department of Emergency  
Medicine, University  
Hospitals of Leicester NHS  
Trust, United Kingdom*

**Wee-Shiong Lim,**  
**MBBS, MMed, MRCP,**  
**MHPE, AGSF, FAMS**

*Department of Geriatric  
Medicine, Institute of  
Geriatrics and Active Aging,  
Tan Tock Seng Hospital,  
Singapore*

**Tak Yeung Chan,**  
**MBBS (Hong Kong), FRCP**  
**(Edinburgh, Glasgow),**  
**FHKAM(MED)**

*Department of Medicine and  
Geriatrics, Kwong Wah  
Hospital, Hong Kong, China*

**Corresponding Author:**

**Dr. Roger Wong**  
[roger.wong@ubc.ca](mailto:roger.wong@ubc.ca)

**Key words:**  
models of care,  
innovations

# DEVELOPING COST-EFFECTIVE NOVEL ACUTE CARE SERVICES FOR OLDER PEOPLE IN THE HOSPITAL OF THE FUTURE: GLOBAL PERSPECTIVES FOR THE NEW DECADE

## Abstract

The development of responsive, efficient and novel cost-effective acute care services for older people remains a high-priority focus around the world and into the next decade. We collate experiences from Canada, United Kingdom, Singapore and Hong Kong to review the latest evidence and experiences that improve the care for older people in hospitals globally. Specifically, we describe a practical and stepwise approach in developing an acute care geriatrics program in the future hospital, and explain how stakeholder based quality improvement methodology can produce the driver for a geriatric program that improves acute care. We further illustrate the above using examples of how to improve delirium care and post-acute care services.

---

This article has been peer reviewed.

**Conflict of Interest:** None

This article was published in July 2019.

*Canadian Geriatrics Journal of CME* is published two to three times a year by Secretariat Central, with office located at 20 Crown Steel Drive, Unit 6, Markham, ON. The publisher and the Canadian Geriatrics Society Scholarship Foundation and the Canadian Geriatrics Society shall not be liable for any of the views expressed by the authors published in Canadian Geriatrics Society Journal of CME, nor shall these opinions necessarily reflect those of CGS, the CGS Scholarship Foundation or the publisher. Every effort has been made to ensure the information provided herein is accurate and in accord with standards accepted at the time of printing. However, readers are advised to check the most current product information provided by the manufacturer of each drug to verify the recommended dose, the method and duration of administration, and contraindications. It is the responsibility of the licensed prescriber to determine the dosages and the best treatment for each patient. Neither the publisher nor the editor assumes any liability for any injury and/or damage to persons or property arising from this publication.

## Introduction

As the world population continues to age rapidly, there is increasing global interest in developing acute care service program models for older people that are high-quality, cost-effective and sustainable.<sup>1</sup>

This is consistent with the Triple Aim approach

([www.ihl.org/Engage/Initiatives/TripleAim/Pages/default.aspx](http://www.ihl.org/Engage/Initiatives/TripleAim/Pages/default.aspx)) recommended by the Institute for Health Care Improvement, which involves improving the patient experience, improving population health and reducing health care cost. This is particularly true at a time when poor outcomes for frail older people in hospitals coupled with an increasing belief in community based proactive care as the panacea for the ills of acute care systems is driving the commissioning and decommissioning of care models. Increasing numbers of frail older people are presenting to acute care settings with medical and social care crises across the world and a recent study proved that frailty was a risk factor for acute admissions. Irrespective of community developments that may affect future care-seeking behaviour in older people, there remains an immediate need for acute care facilities to improve their ability to respond to frail older people contemporaneously (see [www.bmj.com/content/bmj/354/bmj.i5195.full.pdf](http://www.bmj.com/content/bmj/354/bmj.i5195.full.pdf)).

In this article, we provide a step-by-step approach in the development of a robust acute geriatrics program in the future hospital based on experiences in four geographic areas globally. We also discuss how *comprehensive geriatric assessment* (CGA) can be deployed to generate health data that can in turn inform system-based improvements. To illustrate how these principles of geriatric program development can work in a clinical setting, we use delirium intervention as a case study. Last but not least, we recognize that there is tremendous overlap between acute care and community care. We therefore discuss the importance of pursuing a longitudinal holistic approach in following the patient's transition from acute care back to the community.

## Geriatrics program development in the future hospital

In clinical geriatrics, we often embrace the axiom of "form follows function." In a similar manner, when designing an acute geriatrics program in the future hospital,<sup>2</sup> we should bear in mind a number of desirable functional principles. The acute care program design (form) should then follow these principles (function).

In fact, these principles should be tested for effectiveness within the local setting and lead to ongoing redesign of the form. The most important principle that drives all modalities of geriatric care must always be the delivery of person-centred care that is focused on meeting the needs of the patient and the care provider. The care provided by the program should not only be high quality as defined by external benchmarking (such as the Institute of Medicine), but also sustainable based on the number of resources (human and financial) available, which can vary between jurisdictions. One way of achieving this is through the seamless integration of care delivery with health education and research. Finally, the development of strategic partnerships with various stakeholders (such as between acute care, intermediate care and community care) is key and can help to increase the acute care program's flexibility and capacity for growth.

With the above in mind, there are six steps in the development of a specialized geriatrics program in the future hospital and they include: (i) initiating a high-level analysis, (ii) conducting an environmental scan and needs assessment, (iii) designing an operational plan, (iv) developing an inter-professional staffing model, (v) implementing strategies to optimize service and (vi) evaluating the geriatrics program using a quality improvement framework. Of the six steps, the first four are important in the initial program developmental phase, while the last two are important in the subsequent scale-up phase.

When conducting an initial high-level analysis (usually at the level of a single hospital), the objective should be to articulate explicitly what the opportunity looks like within the acute care geriatrics program and hospital. This should include describing the target audience, details of the idea to bring on and the timeline of implementation. It is helpful to provide some aspects of the anticipated high-level results, which can be measured in terms of clinical and financial deliverables. This is where data from the existing literature can be helpful. For instance, there is robust evidence that supports the high-level benefits of acute care for elders (ACE) units, which include reductions in physical function loss, accidental falls, skin breakdown, delirium, length of hospital stay and hospital-related costs<sup>3</sup> (see [www.canadiangeriatrics.ca/wp-content/uploads/2017/07/ACUTE-CARE-FOR-ELDERS-UNITS-EVIDENCE-AND-KEYS-TO-SUCCESSFUL-OPERATION.pdf](http://www.canadiangeriatrics.ca/wp-content/uploads/2017/07/ACUTE-CARE-FOR-ELDERS-UNITS-EVIDENCE-AND-KEYS-TO-SUCCESSFUL-OPERATION.pdf)). Similarly there is evidence of cost-effectiveness of Geriatric Emergency Management (GEM) programs (see [www.canadiangeriatrics.ca/wp-content/uploads/2015/04/Promising-Best-Practice-The-Champlain-Geriatric-Emergency-Management-plus-GEM-plus-Program.pdf](http://www.canadiangeriatrics.ca/wp-content/uploads/2015/04/Promising-Best-Practice-The-Champlain-Geriatric-Emergency-Management-plus-GEM-plus-Program.pdf)), Geriatric Inpatient Units (see [www.canadiangeriatrics.ca/wp-content/uploads/2016/11/Geriatric-Assessment-Units-GAUs-Optimizing-Evidence-Based.pdf](http://www.canadiangeriatrics.ca/wp-content/uploads/2016/11/Geriatric-Assessment-Units-GAUs-Optimizing-Evidence-Based.pdf)) and Geriatric Cross-specialty Collaborations (see [www.canadiangeriatrics.ca/wp-content/uploads/2017/07/LEADING-BEST-PRACTICES-EMERGING.pdf](http://www.canadiangeriatrics.ca/wp-content/uploads/2017/07/LEADING-BEST-PRACTICES-EMERGING.pdf)) Lastly, remember to spell out the next steps that are necessary to deliver the acute care program.

In terms of the environmental scan and needs assessment, remember to obtain data from a variety of sources, including a comprehensive literature review and supplement this with actual local and jurisdictional data. The latter is especially helpful when it comes to projecting for future health needs that can be serviced by the acute geriatrics program. To better understand the core areas of expertise in Geriatrics see the GERIATRIC 5Ms ([www.canadiangeriatrics.ca/wp-content/uploads/2017/04/UPDATE-THE-PUBLIC-LAUNCH-OF-THE-GERIATRIC-5MS.pdf](http://www.canadiangeriatrics.ca/wp-content/uploads/2017/04/UPDATE-THE-PUBLIC-LAUNCH-OF-THE-GERIATRIC-5MS.pdf)), a novel framework being adopted in several countries. The use of population-based modelling should be encouraged. It is important to understand the population group who will benefit most from this acute care geriatrics model, that is, those who are frail.

## **I. Canada: Acute Care for Elders (ACE) Units**

When designing an operational plan for the acute care program, it is important to clearly articulate the principles that underpin the model of care being considered. In the ACE example ([www.canadiangeriatrics.ca/wp-content/uploads/2017/07/ACUTE-CARE-FOR-ELDERS-UNITS-EVIDENCE-AND-KEYS-TO-SUCCESSFUL-OPERATION.pdf](http://www.canadiangeriatrics.ca/wp-content/uploads/2017/07/ACUTE-CARE-FOR-ELDERS-UNITS-EVIDENCE-AND-KEYS-TO-SUCCESSFUL-OPERATION.pdf)), the principles are well described in the literature.<sup>4</sup> To begin, we recommend pinning the ACE principles together – patient-centred care, early rehabilitation, frequent medical review, prepared environment and enhanced discharge planning.

The principles should then be adapted to individual areas and expanded using tools such as program logic models, which can be framed in the form of a patient flow diagram.<sup>5</sup> This kind of tool is commonly deployed in the business world and provides a quantitative lens when explaining the acute care program to funders and administrators. Another important aspect of the operational plan involves process standardization. This can take the shape of standard nursing protocols, algorithms and guidelines, as well as physician order sets. Some common examples for consideration in an acute care program involve standardized processes to mitigate the risks presented by common geriatric syndromes. For example, standard evidence-informed algorithms that direct care of inpatients with delirium, urinary incontinence and frequent falls can be helpful.

An inter-professional model of geriatric service is critical for program sustainability. In terms of composition, refer to [www.canadiangeriatrics.ca/wp-content/uploads/2017/07/ACUTE-CARE-FOR-ELDERS-UNITS-EVIDENCE-AND-KEYS-TO-SUCCESSFUL-OPERATION.pdf](http://www.canadiangeriatrics.ca/wp-content/uploads/2017/07/ACUTE-CARE-FOR-ELDERS-UNITS-EVIDENCE-AND-KEYS-TO-SUCCESSFUL-OPERATION.pdf). In terms of

delivery, while it is important to respect the various scopes of professional practice among the staff, all staff should embrace the same principles of care as described earlier. The challenging question here is what staff complement of each discipline is needed for the acute care program. The determination should be informed by a demand profile and needs analysis. Often this is determined, at least in part, by the number of resources (human and financial) available. It is also common to see a formal business case being constructed to more fully address the question of resourcing.

When implementing strategies to optimize acute geriatrics care, the strategies must be aligned with disruptive innovations and emerging opportunities. Health informatics and data science (e.g., computer-assisted decision support, accessible longitudinal electronic health records, real time feedback for practising clinicians at the time of encounter, etc.) are also important considerations that collect and connect clinical data points before, during and after hospitalization, such as in medication reconciliation. Further studies in these emerging areas are needed to better realize the full potential.

Last but not least, it is crucial to systematically evaluate the geriatrics program using a quality improvement framework.<sup>6</sup> Specifically, the metrics should be determined *a priori* based on broad stakeholder discussion, and can include process indicators (outputs), achievable outcome indicators and balancing indicators that measure if a change designed to improve one part of the system is associated with a new problem in another part of the system (for instance, collect metrics to examine if shortening the length of hospital stay is associated with a higher unplanned readmission rate).

## II. United Kingdom: Managing frailty in acute care – impact and strategies

Over the past six years, there have been several reports in the United Kingdom (UK) focused on improving care of frail older people in acute care settings.<sup>7, 8, 9, 10</sup> Meanwhile it has been projected that public expenditure on health and social care for older people is set to rise by 37% by 2022 compared to 2010.<sup>11</sup> The report from the UK's National Audit Office<sup>12</sup> showed that 63% of hospital bed days were occupied by older patients. Of these, those no longer requiring acute treatment were costing the National Health Service (NHS) an estimated £820-million annually.

Recent data from England suggests that frailty in older people is having a multiplicative effect on care home admission, hospitalization and mortality with the highest impact in one year but continuing into years three and five.<sup>13</sup>

Frailty affects effectiveness of treatment and care models and vice versa. The effect of frailty on influencing care management is highlighted in the database of treatment effects that accompanied the recently published National Institute for Health and Care Excellence (NICE) guideline on managing multi-morbidity (see [www.nice.org.uk/guidance/indevelopment/gid-cgwave0704](http://www.nice.org.uk/guidance/indevelopment/gid-cgwave0704)).<sup>14</sup> Therapeutic intervention in the community<sup>15</sup> only has a mild to moderate effect on maintaining independent living and physical function in frail older people as described in a systematic review and meta-analysis.

Other interventions including “hospital at home” admission avoidance services have continued in many parts of the United Kingdom (UK) despite a Cochrane review, albeit with a small size of included studies, showing that this “probably makes little or no difference to patient health outcomes.”<sup>16</sup>

The fact remains that despite all of these, the UK has been experiencing a steadily increasing number of frail older people with multiple morbidities being admitted to acute care. A recent

report from the Nuffield Trust<sup>17</sup> failed to describe any local or regional English initiative demonstrating any meaningful impact on reducing acute activity within hospitals. The authors concluded that there existed the potential, in some initiatives, to improve the outcomes and experience in patients. There were wide variations in the cost effectiveness of these interventions ranging from increasing net expenditure to demonstrating some overall savings. Successful schemes had targeted specific populations including care home residents and those at the end of life. Over the previous seven years leading up to this report, emergency admissions had increased by 14% and elective admissions by 22%.

The aspiration of providing cost-effective high-quality care to older people closer to home instead of in hospitals remains unfulfilled at the population level for the NHS. A recent benchmarking report on older people's care in acute setting from the NHS Benchmarking Network<sup>18</sup> shows that older people account for 23% of emergency department attendances, 53% of admissions to acute assessment units and 63% of inpatient beds following unplanned admissions. The report, in the extensive quality parameters, also displayed tremendous variation in care processes, clinical delivery, harm and outcomes in older people.

It may be useful to reflect on this state of affairs with respect to the care system in the English NHS and the outcomes experienced by older people. Paul Batalden, founding Chair at the Institute for Health Care Improvement, once commented how "every system is perfectly designed to get the results it gets" ([www.ihc.org/communities/blogs/origin-of-every-system-is-perfectly-designed-quote](http://www.ihc.org/communities/blogs/origin-of-every-system-is-perfectly-designed-quote)). Is it possible the outcomes experienced by older people are secondary to the way the NHS was designed? This was predominantly for single-disease presentations in a much younger population. An increase in life expectancy, with increased prevalence of multiple morbidities in older people, is giving rise to more complex presentations in older people to a workforce largely lacking in geriatric competencies.

Addressing these issues through the delivery of *comprehensive geriatric assessment* (CGA) in different acute care settings has been tested in some locales. These include intervention studies in acute frailty unit<sup>19</sup> and the emergency department.<sup>20</sup> There is a need for CGA to be systematized across the system to achieve the shift out of hospital activity. However, this requires integrated work towards a common aim.

A multi-site, exploratory case study<sup>21</sup> into NHS models that had achieved reductions in decreasing admission rates in older people over 85 years of age found that successful sites had strong, stable leadership, shared vision and strategy based around a set of common values that were present across the system.

A recently established quality improvement collaborative, the Acute Frailty Network ([www.acutefrailtynetwork.org.uk](http://www.acutefrailtynetwork.org.uk)),<sup>22</sup> based on the principles described in the "Silver Book" ([www.bgs.org.uk/resources/silver-book](http://www.bgs.org.uk/resources/silver-book))<sup>7</sup> is supporting NHS acute care organizations to systematize CGA and improve service and patient outcomes while awaiting other initiatives to take effect.

### **III. Singapore: Innovation in acute care – delirium management as example**

Delirium is a common and serious condition in older hospitalized patients.<sup>23</sup> It is often poorly managed, with inappropriate use of physical restraint and chemical sedation leading to a downward cascade of iatrogenesis. Not surprisingly, the Assessing Care of Vulnerable Elders Project has ranked delirium among the top three conditions for which the quality of care can be improved.<sup>24</sup> Pharmacological approaches for delirium have been largely disappointing, whereas general medical units with best practice in delirium were unable to demonstrate tangible benefits in physical function, health status or service use.<sup>25</sup>

We developed the Geriatric Monitoring Unit (GMU), a five-bed specialized delirium management unit, at the Tan Tock Seng Hospital in Singapore as an acute care innovation to improve outcomes amongst frail delirious elderly patients at risk of adverse outcomes.<sup>26</sup> The evidence-based multi-component systematic approach employed in GMU comprises three major components: an elder-friendly and delirium-friendly environment, bright light therapy and core program interventions.<sup>27</sup> In brief, the GMU assimilated specific measures from two established programs: (i) the Delirium Room model, which provides comprehensive medical care with multidisciplinary team meetings and employs behavioural and appropriate non-pharmacological strategies as first-line management in delirious patients;<sup>28</sup> and (ii) the concept of structured core interventions developed in the Hospital Elder Life Program.<sup>29</sup> A novel feature is the incorporation of evening bright light therapy via installed ceiling lights (2000-3000 lux) to establish a healthy sleep-wake cycle, and shift the altered circadian sleep-wake cycle to the desired phase.<sup>30</sup>

GMU resulted in improvement in discharge outcomes, namely physical function compared with control subjects (Modified Barthel Index, mean±SD: 19.2±18.3 versus 15.1±18.0,  $P<0.05$ ) and sleep parameters such as total sleep time, sleep bouts and number of awakenings.<sup>30, 31, 32</sup> There was no difference in length of stay or duration of delirium between GMU and control subjects. The zero physical restraint rate in GMU was achieved without a concomitant rise in chemical restraint use. This translated to lower pressure ulcer and nosocomial infection rates in GMU (4.1% and 10.7% respectively) compared with pre-GMU (9.1% and 23.4% respectively) subjects.<sup>32</sup> The one-year mortality of 34% compares favourably with figures reported in other series (35-40%).<sup>33, 34</sup> Continued utilization of GMU with shorter duration of delirium (range: 3-8 days) beyond the program evaluation period attests to GMU as a sustainable model of delirium care that is premised on sound evidence-based practices. The extension of the research program after the period of formal program evaluation has also led to value-adding research that informed the understanding of the trajectory and predictors of delirium and the impact of concomitant physical frailty on adverse outcomes.<sup>35, 36</sup>

#### **IV. Hong Kong: Innovation in post-acute community care services**

Like many parts of the world, Hong Kong faces an aging population, placing particular pressure on effective and efficient post-acute care to relieve the acute care bed pressure. A number of innovative community care services have been developed.

The Integrated Care and Discharge Support (ICDS) program has been implemented in all acute public hospitals in Hong Kong since 2011. It is a geriatrician-led program with integrated medical, social and rehabilitation interventions. Target patients are those with a Hospital Admission Risk Reduction Program for Elderly (HARRPE)<sup>37</sup> score higher than 0.2. A score of 0.2 signifies that the patient has a 20% chance of readmission in the following 28 days. Patients are also recruited by clinical referrals, such as stroke or hip fracture and proactive screening. This discharge support program usually lasts 8 to 12 weeks and comprises home visit, Fast Track Clinic, Geriatric Day Hospital rehabilitation, social support and temporary residential services. An evaluation study on the effectiveness of this program was recently conducted in a teaching hospital.<sup>38</sup> This was a six-month pre- and post-intervention study involving 1090 patients who were enrolled in this program over one year. There was a significant reduction in emergency department attendances by 40%, acute hospital admission by 47% and hospital bed day utilization by 31% during the intervention period. There was also a potential annual cost saving of approximately US \$2.9 million.

Community Health Call Centre (CHCC) is another community support program, which targets patients who are discharged from medical wards after an ED admission with a HARRPE score

higher than 0.17. Patients are contacted proactively within 48 hours upon discharge by a registered nurse using standardized protocols and clinical information from an electronic patient record system. Patients' physical conditions, discharge medications, follow-up arrangement and community resources are checked. After the initial contact, patients can make inbound calls to the centre for any episodic illnesses. This program relies heavily on the extensive network established with various hospital and community stakeholders to provide a timely response for these high-risk elderly patients. Recent evaluation showed that CHCC was cost-effective in reducing emergency department attendance by 27% and admission by 26% over 90 days.<sup>39</sup>

Successful implementation of these discharge support programs depends on several factors. The development of an automated risk prediction tool enables early identification of elderly patients who are at risk of repeated admission. An interdisciplinary and integrated approach combining medical, social and rehabilitation intervention is also important as problems in older patients are typically multifactorial. Specialized geriatric services, such as Geriatric Day Hospital and Fast Track Clinic, are essential to maintain patients' functional state and manage acute deterioration during this transitional period. A close collaboration with community partners, like primary care doctors and community nurses is also indispensable to provide timely medical care to these frail older people.

## Conclusion

In this article, we have described the experiences of how to strategize, advocate for and set up an acute care geriatrics service from four geographic perspectives of the world. While the general framework and specific steps that were followed can be useful in producing a strategic approach for you, we highly recommend a thorough understanding and careful tailoring of the strategy to the needs in your local jurisdiction.

## REFERENCES:

1. Wong RYM. Older people presenting to acute care hospitals. In Oxford Textbook of Geriatric Medicine, Michel J-P, Beattie BL, Martin FC, Walston JD Eds.; Oxford University Press: Oxford, United Kingdom, 2018; pp 247–254.
2. Lai L, Wong RY. Leading best practice: Acute care for elders units – evidence and keys to successful operation. Canadian Geriatrics Society Journal of CME 2017; 7: 1.
3. Fox MT, Persaud M, Maimets I, et al. Effectiveness of acute geriatric unit care using acute care for elders components: a systematic review and meta-analysis. Journal of American Geriatrics Society 2012; 60(12): 2237-2245.
4. Landefeld CS, Palmer RM, Kresevic DM, et al. A randomized trial of care in a hospital medical unit especially designed to improve the functional outcomes of acutely ill older patients. New England journal of medicine 1995; 332(20): 1338-1344.
5. Wong RYM, Shaw M, Acton C, Wilbur K, McMillan M, Breurkens E, Sowden C, Trautman SM, Chan N. An interdisciplinary approach to optimize health services in a specialized acute care for elders (ACE) unit. Geriatrics Today: Journal of the Canadian Geriatrics Society 2003; 6(3): 177-186.
6. Wong RYM. Teaching quality improvement in residency education; Royal College of Physicians and Surgeons of Canada: Ottawa, Canada, 2015.

7. British Geriatrics Society, Royal College of Physicians, Royal College of Nursing, et al. "Silver book": quality care for older people with urgent and emergency care needs. 2012.  
[www.bgs.org.uk/resources/silver-book](http://www.bgs.org.uk/resources/silver-book).
8. Royal College of Physicians of London. Acute care toolkit 3: acute medical care for frail older people. 3 Sep 2015. [www.rcplondon.ac.uk/guidelines-policy/acute-care-toolkit-3-acute-medical-care-frail-older-people](http://www.rcplondon.ac.uk/guidelines-policy/acute-care-toolkit-3-acute-medical-care-frail-older-people).
9. Oliver D, Foot C, Humphries R. Making health and care systems fit for an ageing population. King's Fund. 2014 [www.kingsfund.org.uk/sites/files/kf/field/field\\_publication\\_file/making-health-care-systems-fit-ageing-population-oliver-foot-humphries-mar14.pdf](http://www.kingsfund.org.uk/sites/files/kf/field/field_publication_file/making-health-care-systems-fit-ageing-population-oliver-foot-humphries-mar14.pdf).
10. Acute Frailty Network. Improving services for frail older people. Feb 2015.  
<https://www.acutefrailtynetwork.org.uk/About-Us>.
11. Wittenberg R, Hu B, Comas-Herrera A, Fernandez JL. Care for older people: Projected expenditure to 2022 on social care and continuing healthcare for England's older population. Nuffield Trust. December 2012. [www.nuffieldtrust.org.uk/files/2017-01/care-for-older-people-web-final.pdf](http://www.nuffieldtrust.org.uk/files/2017-01/care-for-older-people-web-final.pdf).
12. Department of Health. Discharging older patients from hospital. NAO. May 2016.  
[www.nao.org.uk/wp-content/uploads/2015/12/Discharging-older-patients-from-hospital.pdf](http://www.nao.org.uk/wp-content/uploads/2015/12/Discharging-older-patients-from-hospital.pdf).
13. Clegg A, Bates C, Young J, et al. Development and validation of an electronic frailty index using routine primary care electronic health record data. Age and Ageing 2016.  
[www.ageing.oxfordjournals.org/content/early/2016/03/03/ageing.afw039.full](http://www.ageing.oxfordjournals.org/content/early/2016/03/03/ageing.afw039.full).
14. National Institute for Health and Care Excellence. Multimorbidity: clinical assessment and management. 21 September 2016 [www.nice.org.uk/guidance/indevelopment/gid-cgwave0704](http://www.nice.org.uk/guidance/indevelopment/gid-cgwave0704).
15. Beswick AD, Rees K, Dieppe P, Ayis S, Goberman-Hill R, Horwood J, et al. Complex interventions to improve physical function and maintain independent living in elderly people: a systematic review and meta-analysis. The Lancet. 2008 Mar 1;371(9614):725-735. Available from, DOI: 10.1016/S0140-6736(08)60342-6.
16. Shepperd S, Iliffe S, Doll HA, Clarke MJ, Kalra L, Wilson AD, Gonçalves-Bradley D. Admission avoidance hospital at home. Cochrane Database of Systematic Reviews 2016, Issue 9. Art. No.: CD007491. DOI: 10.1002/14651858.CD007491.pub2.
17. Imison C, Curry N, Holder H, Castle-Clarke S, Nimmons D, Appleby J, Thorlby R, Lombardo S (2017). Shifting the balance of care: great expectations. Research report. Nuffield Trust.
18. NHS Benchmarking Network Dashboard report 2014-15: Older people in acute care setting. [www.gallery.mailchimp.com/85b1893e69ce6351351ec4385/files/OP\\_Care\\_in\\_Acute\\_Settings\\_OP000.pdf](http://www.gallery.mailchimp.com/85b1893e69ce6351351ec4385/files/OP_Care_in_Acute_Settings_OP000.pdf).
19. Silvester KM, Mohammed MA, Harriman P, Girolami A, Downes TW. Timely care for frail older people referred to hospital improves efficiency and reduces mortality without the need for extra resources. Age and Ageing 2014;43:472-7.  
<http://ageing.oxfordjournals.org/content/43/4/472.full.pdfdoi:10.1093/ageing/aft170 pmid:24222658>.
20. Conroy SP, Ansari K, Williams M, Laithwaite E, Teasdale B, Dawson J, Mason S, Banerjee J. A controlled evaluation of comprehensive geriatric assessment in the emergency department: the "Emergency Frailty Unit." Age and Ageing. 2014 Jan;43(1):109-14. doi: 10.1093/ageing/aft087. Epub 2013 Jul 23.



21. Wilson A, Baker R, Bankart J, Banerjee J, Bhamra R, Conroy S, Kurtev S, Phelps K, Regen E, Rodgers S, Waring J. Establishing and implementing best practice to reduce unplanned admissions in those aged 85 years and over through system change [Establishing System Change for Admissions of People 85+ (ESCAPE 85+)]: a mixed-methods case study approach. *Health Serv Deliv Res* 2015;3(37).
22. Acute Frailty Network. [www.acutefrailtynetwork.org.uk](http://www.acutefrailtynetwork.org.uk).
23. Inouye SK: Delirium in hospitalized older patients. *Clin Geriatr Med* 1998, 14:745-64.
24. Sloss EM, Solomon DH, Shekelle PG, Young RT, Saliba D, MacLean CH, Rubenstein LZ, Schnelle JF, Kamberg CJ, Wenger NS: Selecting target conditions for quality of care improvement in vulnerable older adults. *J Am Geriatr Soc* 2000, 48:363-9.
25. Goldberg SE, Bradshaw LE, Kearney FC, Russell C, Whittamore KH, Foster PE, Mamza J, Gladman JR, Jones RG, Lewis SA, Porock D. Care in specialist medical and mental health unit compared with standard care for older people with cognitive impairment admitted to general hospital: randomised controlled trial (NIHR TEAM trial). *Bmj*. 2013 Jul 2;347:f4132.
26. WS Lim, SF Wong, I Leong, P Choo, WS Pang (2017). Forging a Frailty-ready Healthcare System to Meet Population Aging. *Int. J. Environ. Res. Public Health* 2017, 14(12), 1448.
27. Chong MS, Chan MP, Kang J, Han HC, Ding YY, Tan TL. A new model of delirium care in the acute geriatric setting: geriatric monitoring unit. *BMC Geriatr*. 2011;11:41.
28. Flaherty JH, Tariq SH, Raghavan S, Bakshi S, Moinuddin A, Morley JE. A model for managing delirious older inpatients. *J Am Geriatr Soc*. 2003;51(7):1031-1035.
29. Inouye SK, Bogardus ST, Charpentier PA, et al. A multicomponent intervention to prevent delirium in hospitalized older patients. *N Engl J Med*. 1999;340(9):669-676.
30. Chong MS, Tan KT, Tay L, Wong YM, Ancoli-Israel S. Bright light therapy as part of a multicomponent management program improves sleep and functional outcomes in delirious older hospitalized adults. *Clin Interventions in Aging*. 2013;8:565.
31. L Tay, Chan M, Chong MS. Functional improvement in hospitalized older adults is independent of dementia diagnosis: Experience of a specialized delirium management unit. *Journal of Hospital Medicine*. 2013;8:321-7.
32. Chong MS, Chan M, Tay L, Ding YY. Outcomes of an innovative model of acute delirium care: the Geriatric Monitoring Unit (GMU). *Clin Interventions in Aging*. 2014;9:603.
33. McAvay GJ, Van Ness PH, Bogardus ST Jr, Zhang Y, Leslie DL, Leo-Summers LS, Inouye SK: Older adults discharged from the hospital with delirium: 1-year outcomes. *J Am Geriatr Soc* 2006, 54:1245-50.
34. Inouye SK, Westendorp RG, Saczynski JS. Delirium in elderly people. *The Lancet*. 2014 Mar 14;383(9920):911-22.
35. Lam CY, Tay L, Chan M, Ding YY, Chong MS. Prospective Observational Study of Delirium Recovery Trajectories and Associated Short-Term Outcomes in Older Adults Admitted to a Specialized Delirium Unit. *J Am Geriatr Soc* 2014;1;62(9): 1649-57.
36. J Chew, MS Chong, WS Lim, M Chan, L Tay. Frailty as a predictor for delirium recovery, mortality and functional decline in older adults admitted to a specialized delirium care unit. *Geriatr Gerontol Int* 2017;17(12):2472-2478.

37. Tsui E, Au, SY, Wong CP, Cheung A, Lam P. Development of an automated model to predict the risk of elderly emergency medical admission within a month following an index hospital visit: A Hong Kong experience. *Health Informatics Journal* 2015; 21(1): 46-56.

38. Lin FO, Luk JK, Chan TC, Mok WW, Chan FH. Effectiveness of a discharge planning and community support program in preventing readmission of high-risk older people. *Hong Kong Medical Journal* 2015; 21: 208-216.

39. Ng B. Establishment of an innovative CHCC in Hong Kong to prevent avoidable hospitalization. *The Quarterly* 2011. The Royal Australian College of Medical Administrators.