PART I

Chapter 3

Using interRAI assessment systems to measure and maintain quality of long-term care[1]

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Rapidly ageing populations and increasing prevalence of chronic diseases present major challenges for policy makers. Populations as well as individuals have different prevalence of conditions related to ageing and chronic disease. This is compounded by cultural and institutional differences in care service provision, eligibility criteria and funding models. Comparing differences at population and individual level helps policy makers address the complexities of maintaining quality in long-term care. This chapter describes how evolution in development of needs assessment instruments has led to a way of producing high-quality data for policy makers. It describes in detail the interRAI system of standardised needs assessment instruments for routine care that generate aggregatable data. Data driven algorithms generate outcome scales, care planning support protocols, quality indicators, and a resource-use casemix system. The chapter then illustrates, with data from nine OECD countries and regions, how needs assessment data recorded at the point of care using the interRAI system can inform policy. It ends with a discussion of factors for consideration when implementing sophisticated needs assessment tools.

The quality challenge in long-term care

Providing for the health and social care needs of the growing numbers of older people and people with chronic diseases in the face of rising costs, limited budgets and increasing dependency ratios is a major challenge for industrialised countries. In emerging economies, the rate of population ageing is accelerating, increasing the pressures on policy makers attempting to respond to the needs of rapidly growing numbers of older people. For example, it is estimated that the proportion of people aged 65+ in China will double from 7% to 14% of the population in 26 years (Kinsella and He, 2009). In France this change took place over 115 years. For countries that are already "old" demographically, as well as for those that are ageing rapidly, concerns about the costs and quality of care for older people are inextricably linked. Good quality integrated services across the continuum of care can slow the rate of health-related declines, reduce health care expenditures related to avoidable conditions and improve quality of life.

This challenge is immense as the nature of ageing-related conditions and factors relating to provision of care and support are multiple and varied. They include variation in prevalence of conditions commonly related to ageing, different configurations of service provision and different funding models. The result is a tangle of interdependent factors that connect in different patterns from care provider to care provider, region to region and nation to nation.

Only by using reliable data with understandable and comparable constructs can one begin to make progress in determining cost effective services that maintain quality of care. A logical starting point would be aggregating reliable valid data on those individuals receiving care, thus allowing for analysis of the benefits of different models of care for people with comparable care requirements.

The interRAI system for assessment of care needs (*www.interRAI.org*) generates data that can be aggregated from routine clinical practice to provide evidence that is highly relevant to key questions facing decision makers in long-term care. For example, policy makers and service providers must understand the needs and resource requirements of persons across the continuum of care. The inherent complexity of the populations served in nursing home and community settings means that this evidence must be multidimensional and provide a comprehensive view of the person – one that cannot be obtained from administrative records alone.

The information can be used for planning purposes to determine the nature and intensity of the health and social services that are needed. Longitudinal information is essential at the person-level to evaluate the effectiveness of care plans and at the organisational level to evaluate the quality of care. Comparative regional and cross-national data provide insights about practice patterns and policy decisions that may not be self-evident if comparisons are made only between like-minded organisations within a limited geographic region.

This chapter describes the background to the formation of the interRAI collaboration, the development, design, distribution, and potential contribution of the interRAI approach to assessment for care and systematic embedding of a quality driven assessment system in care delivery. It also presents data from use of the interRAI system in nine OECD and non-OECD countries and regions, demonstrating the potential for international benchmarking of performance in long-term care.

Poor care quality led to a call for more systematic assessments of care needs in the United States

In the United States, major scandals in long-term care of older people prompted Congress to ask the US National Academy of Sciences and its Institute of Medicine (IOM) to examine nursing home quality and report on how to improve nursing home regulation. The IOM's expert committee issued its report in 1986 after a 2.5 year study and a series of hearings (Institute of Medicine, 1986; Hawes, 1990). One of the central recommendations was the development of a uniform, comprehensive resident assessment system.

The IOM Committee argued that a uniform, comprehensive assessment of each resident was essential to improving the quality of care in the nation's nursing homes. Comprehensive assessment of physical, cognitive and social functional status was (and still is) seen as the cornerstone of high quality care of older people, identifying issues requiring individualised care planning so that the best outcome of care can be achieved. The IOM recognised that resident-level data from routine assessment of care needs would be the most likely to provide reliable data on quality and outcomes of care. In fact it is not possible to monitor or improve quality of care without being able to measure and compare progress over time or performance between organisations, regions or nations.

Many clinical and care services adopt structured approaches to assessment, and the tradition of standardised assessment is strong in many clinical domains. Many disciplines such as neuropsychology, physical, occupational, speech and respiratory therapy have specific assessment tools for structured recording of care need, severity and care outcomes. In care of older people, there is now a long tradition of assessment and there are many publications listing historical best practice (Kane and Kane, 1981; Rubenstein et al., 1995).

As a result of the IOM report, development of the nursing home Minimum Data Set – Resident Assessment Instrument (MDS-RAI) was embedded in a set of reforms enacted by the United States Congress in the Omnibus Budget Reconciliation Act of 1987 (OBRA '87).

The original RAI project development consortium was commissioned by the Health Quality Bureau of the US Health Care Finance Administration. The process began by reviewing more than 80 existing assessment instruments incorporating inputs from the designers of those assessments and the long tradition of behavioural and performance assessments and symptom reviews, including that of developmentally disabled individuals. The importance of the review of these kinds of assessments was that they enabled the measures developed within the MDS-RAI, the assessment devices, records of symptoms present and other pieces of information about the resident, to substantially increase the breadth, depth and strength of the assessment system (Morris et al., 1990).

Development was completed in 1990 and the first version of the MDS-RAI was implemented in all US nursing homes in 1990-92.

The evolution of assessment instruments and the interRAI collaboration has provided an answer

Standardised assessment instruments enable the structured recording of information about an individual in such a way that the data generated can be used to create performance scales. These scales measure, for example, physical abilities (activities of daily living, or ADLs) cognitive impairment and quality of life. The information recorded can be observed performance against assessment items or self-reported responses to questionnaires. The data can be aggregated to show change in performance of individuals and populations over time and in response to treatment and service developments.

The evolution of assessment instruments can be divided into three generations. First generation instruments, of which there are very large numbers, are standalone scales designed to measure a single construct for a single purpose [e.g., Barthel Index for Activities of Daily Living; (Mahoney and Barthel, 1965), Mini Mental State Examination – MMSE (Folstein et al., 1975), Geriatric Depression Scale – GDS (Yesavage et al., 1982), "MUST" for nutrition (Stratton et al., 2004)]. The strength of the single domain assessments lies in their discrete measurement rules and (for the best) extensive testing of psychometric properties (i.e., reliability and validity) and use in clinical trials. However, these limited domain assessment instruments cannot be used together to produce efficient and reliable integrated multi-dimensional assessment tools. Attempts to use clusters of these instruments typically result in cumbersome assessment approaches employing overlapping assessment items and conflicting assessment methods. The use of clusters of stand-alone instruments also lacks proven utility and acceptability across different care settings.

Second-generation instruments are multidimensional instruments that address many clinical domains with applicability in many settings. Individual items are constructed to record focused information about the individual, and it is the assembly of these items into specific sections that form the backbone of a comprehensive assessment schedule. Examples include CAPE (Pattie et al., 1979), FACE (*www.face.eu.com*) and EASYCARE (*www.easycare.org.uk*). The other principal feature is that they are designed to support care planning, rather than just to record function in particular domains. The combination of assessment items covers specific medical, functional and social issues that need to be addressed in order to provide optimal care to the individual as a whole person. Some include the ability to trigger action through care planning protocols for conditions identified in the assessment.

A secondary but very significant by-product of good multi-dimensional assessment instruments is that the data can be aggregated to produce measures of outcome, casemix, quality of care and eligibility criteria for access to services (Hirdes et al., 1999). Databases consisting of aggregated data from quality second-generation instruments provide a basis for comparisons between regions and nations as well as changes over time.

Adoption and use of these assessment scales and assessment systems are largely dependent on the local choice of practitioners, though the more sophisticated second generation scales may be adopted by provider organisations or local and regional jurisdictions. Two systematic reviews describe and compare the characteristics of the most widely available instruments including the first versions of the interRAI assessment instruments. Box 3.1 provides an overview of the history and evolution of the interRAI collaboration (Lincoln Centre for Ageing and Community Care Research, 2004; and *www.nzgg.org.nz/resources/57/Assess_Processes_GL.pdf*).
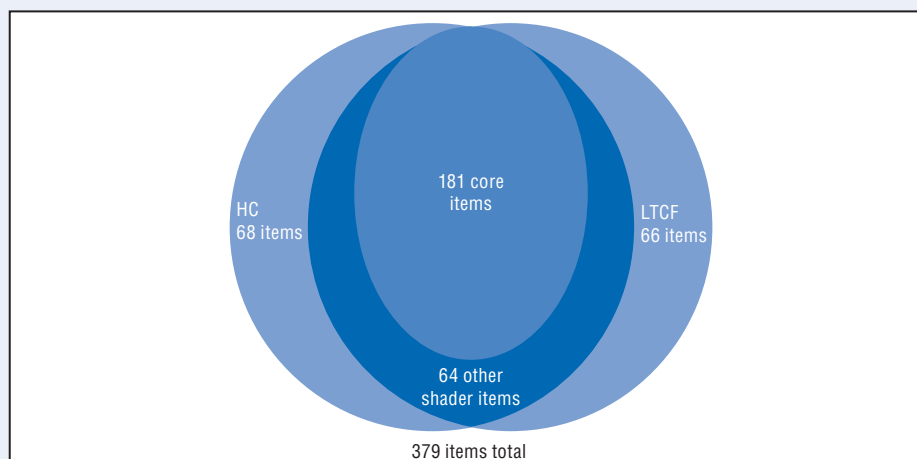
Box 3.1. **The interRAI collaboration and the interRAI integrated suite**

InterRAI is a not-for-profit collaboration, now composed of around 70 clinicians, researchers and health administrators from over 30 countries. It was founded in 1992 with the vision statement "the assembly of accurate clinical information in a common format within and across services sectors and countries enhances both the well-being of frail persons and the efficient and equitable distribution of resources" (Fries et al., 2003).

During the first two years, the founding members from Europe, Nordic countries and the United States focussed on the use of the MDS-RAI and the application of the RUGs casemix system in long-term residential care (Resource Utilization Groups – RUG-III – see below). Introduction of the MDS-RAI into nursing home (NH) care was associated with measurable improvements in the standard of care, particularly when quality indicators derived from the instrument were introduced (Mor et al., 1997; Mor et al., 2005). Work soon began on a community care version of the MDS-RAI, and in 1994 the initial version of the Resident Assessment Instrument for Home Care (RAI-HC) was introduced as a model for comprehensive assessment in a community setting (Morris et al., 1997). By 1997, interRAI researchers had completed a revision of the MDS-RAI (v 2.0) and the initial focus of interRAI on care of older persons had broadened, applying the assessment technology to other vulnerable populations. To date assessment instruments have been developed for: acute care (Carpenter et al., 2001), post-acute care, community health, home (community) care, long-term care facilities, assisted living, initial contacts, deaf blind persons, emergency psychiatric screening, hospital and community mental health Hirdes et al., 2002a), palliative care (Steel et al., 2003), physical and intellectual disability (Martin et al., 2007), child and youth intellectual disability, and quality of life *(www.interrai.org/index.php?id=3)*.

InterRAI's work continued to evolve toward development of a fully integrated assessment system (known as the interRAI Suite), the first third-generation assessment system. A new set of subjective quality of life instruments is about to be released as companions to the assessor-rated interRAI instruments, the combination of which will comprise the first fourth generation assessment system for use in the continuum of care.

The number of items and their distribution in the interRAI home care and long-term care facilities assessment instruments

Source: Illustration of interRAI home care and long-term care facilities assessment instruments.

> Box 3.1. **The interRAI collaboration and the interRAI integrated suite** (cont.)
>
> The first versions of interRAI instruments all had a comparable look and feel, since they were developed sequentially from 1993 through 2001. However, specific items did not always measure identical phenomena in identical ways across settings and care groups. While not a problem within any given care setting or for general comparisons of populations across settings, these inconsistencies limited the extent to which interRAI assessment information could flow seamlessly across all boundaries. An integrated system enables transfer of common information across transitions across care settings, both orienting the recipient caregiver and reducing the need for completing paper work. In 2001, interRAI therefore established a systematic process to create a third-generation assessment system – a fully integrated suite of instruments – the interRAI Suite. It is composed of a unified set of items that are used to populate the full range of assessment instruments.
>
> A principal benefit of the interRAI Suite is that it delivers consistent recording of information across care settings, allowing comparison of immediate or long term change in status and across settings. Clinicians in one care setting can understand the language and information from health and social care professionals in another, and the data are directly transferrable. The assessment items are standard, the core items used in all settings, with other items used in many, several, or even only a single setting (see figure above). Thus, design of software systems to support multi-sector assessment and care planning is facilitated by having consistent items across multiple different assessment instruments. This also greatly facilitates the development of assessments in new care settings or for new care groups. Training of assessors is also simplified as, for example, a nurse trained in the use of an instrument in one sector can quickly learn to use a companion instrument in another.

Third-generation instruments extend the concept of second-generation tools to multiple care settings. They provide assessment processes that can be used across different populations and care settings. Moreover, they comprise an integrated suite of instruments designed to support continuity of assessment practices across the continuum of care. They create person-focussed, longitudinal records that can be viewed, understood and used irrespective of care setting. The use of the same protocols to support care planning in sectors between which people may move (e.g. acute, community and residential care) allow for a collaborative approach to service provision that spans the continuum of care. The focus is on recording the information about the individual, their changing strengths, abilities and preferences rather than the information required only by a particular care setting where that person happens to be at any given time. Currently the interRAI suite of assessment instruments is the only example of this type (see Box 3.1). This integrated system enables transfer of common information across care settings, thereby facilitating continuity of care across transitions. A number of regional and national jurisdictions are now introducing the interRAI instruments in response to growing pressures on care delivery services (*http://interrai.org/index.php?id=7*).

Combining observations and subjective ratings by the person describing his/her experience in a care setting will become the next generation of interRAI solutions. These instruments will combine the physical, cognitive and social functional measures in assessor-rated instruments with self-reported quality of life surveys completed by the person.

Structure and use of the interRAI assessment instruments

InterRAI instruments include manuals to support training on standardised assessment items. They also include Clinical Assessment Protocols (CAPs) and numerous clinical summary scales and algorithms that help to "interpret" the clinical findings and describe the severity of impairment or risk of problems in a variety of domain areas. The manuals give an extensive description of the assessment process. They also describe the intent of assessing that domain and the process for conducting a high quality assessment of the domain. In addition, they outline coding rules for each item and provide case examples to illustrate key principles associated with appropriate assessment and coding. They are designed to be used by care professionals for the assessment of the care needs of individuals and to support and inform best practice care planning. Once the assessment is completed, scales summarising major domains (e.g., depression, cognition, and physical function) are calculated. These scales are automatically constructed from the aggregation of information that has been recorded for the sole purpose of determining the care that a person will require.

Assessments are mostly commonly completed by registered nurses, but are also undertaken by therapists and care managers from social work who have been trained in their use. The process of assessment includes a conversational dialogue between the care professional and person whose care needs are being assessed, covering all relevant domains. A number of items are specifically addressed to the person being assessed, such as aspects of mood, self-reported perception of health and preferences for activities, etc. However, to complete other items, assessors also review all available relevant records and talk with formal and informal care givers and relatives who are associated with the person whose assessment is being completed. Typically assessments will take around 40 minutes to one hour to complete where assessors are familiar with the assessment instruments. Those people with complex care needs will require more time, up to two hours. In nursing home populations in particular, this time is likely to be distributed across more than one day as carers and assessors get to know residents and their family and carers.

The assessment records what is achieved by the person, not his or her hypothetical "potential". Where there is uncertainty (e.g., conflicting information from different sources), the assessor records information based on his/her best judgement. Where there is evidence of cognitive or communication impairment, there will be increased reliance on information provided by care-givers and staff, driven by clear protocols laid out in the instrument training manuals. The process has been shown to be reliable and valid in systematic evaluation of the instruments with data from a wide range of settings and nations (Morris et al., 1990; Morris et al., 1997a, Morris et al., 1997b; Poss et al., 2008).

The assessment instruments themselves have a *uniform structure* that gives them their inherent strength. The suite of instruments are constructed around a set of data items that are assembled and configured differently for given care populations and care settings. There is a set of core items addressing key aspects of domains common to all settings and populations that appears in all the instruments. Each complete interRAI instrument consists of the core set and additional data items relevant for assessments in the care setting and care group. The figure in Box 3.1 shows the number of data items in the interRAI Home (community) Care (HC) and interRAI Long-term care Facilities (LTCF) assessment instruments. Each complete assessment instrument also includes a training manual, calculated scales (including screeners and severity measures), a set of algorithms that trigger "Clinical Assessment Protocols" (CAPs), quality indicators and casemix measures relevant to resource use.

The assessment items

The assessment items are organised into sections dealing with issues such as cognitive patterns, communication and hearing patterns, physical functioning, health conditions and preventive health measures. Typically, an assessment instrument will have around 20 sections within which there are a number of items to characterise each issue in various ways (e.g., frequency, severity, presence/absence). Every item and response code has concise and precise definitions including time frames. Most, but not all items refer to the past three days and define specific exclusions (e.g., excluding the washing of the back as part of assessing ability to bathe), as well as giving examples (e.g., vision is measured "with glasses or with other visual appliance used"). These characteristics ensure high inter and intra – observer reliability. Table 3.1 shows the sections and number of core and additional items in the interRAI Long-term care Facilities (LTCF) assessment instrument

Table 3.1. **Sections and number of core and additional items in the interRAI long-term care facility (LTCF) assessment instrument**

Section	Core items	Additional items	Section	Core items	Additional items
Identification information	24	11	Admission and initial history	11	8
Cognition	9	1	Communication and vision	4	3
Mood and behaviour	20	1	Psychosocial well-being	3	16
Physical functioning	15	4	Continence	2	
Disease diagnoses	25	0	Health conditions	33	2
Oral and nutritional status	11	3	Skin condition	7	0
Activity pursuits	0	18	Medication	11	0
Treatment and procedures	2	46	Responsibility and directives[1]	0	10
Discharge potential	0	4	Discharge	2	3
Assessment information	2	0			

1. Legal matters.
Source: InterRAI long-term care facility assessment instrument.

Complex issues are addressed by recording information about each component. For example, in the assessment of symptoms of pain, the interRAI assessment items address frequency, intensity, consistency and pain control. The pressure ulcer item records precise descriptive information about the most severe ulcer present – persistent skin redness, partial loss of skin layers, deep craters in the skin, breaks in skin exposing muscle or bone, and the presence of necrotic eschar.

The scales

Once an interRAI assessment has been completed, algorithms generate scales to provide severity measures (e.g., the extent of dependency in activities of daily living – ADL) or diagnostic screeners (e.g., whether a person has dementia). Scales are constructed from information recorded for care purposes alone. For example, the well validated Cognitive Performance Scale (CPS) is constructed from four items, short term memory, ability to make self understood, ability to feed oneself and whether or not comatose (Morris et al., 2004). The scales are computed by the assessment software.[2] Thus, automatic presentation of the CPS score, for example, informs the care professional of the degree of cognitive impairment, overcoming the well-reported phenomenon of cognitive impairment being

under-recognised (McDonald et al., 2003). Numerous scales are currently available (*www.interrai.org/index.php?id=106*) encompassing cognition, communication, mood (depression), instrumental and personal ADL, pain and health stability, social engagement, etc. (Morris et al., 1999; Carpenter et al., 1999; Burrows et al., 2000; Fries et al., 2001; Hirdes et al., 2003; Mor et al., 1995).

The Clinical Assessment Protocols

InterRAI's Clinical Assessment Protocols (CAPs) are clinical algorithms that identify the need for care plans to address factors that may lead to adverse outcomes that are amenable to clinical intervention (Table 3.2 shows the list of CAPs of the interRAI Home Care (HC) instrument). They are an integral feature of each individual assessment instrument in the Suite and have a standard structure. CAPs were each written by multinational groups of academics and clinicians (both interRAI members and others) selected for their expertise in each CAP domain. The development method included review of the relevant scientific literature and expert opinion, and analysis of existing extensive interRAI data sets to identify sub-populations with adverse (or in some cases positive) outcomes across multiple assessment periods.

Table 3.2. **List of CAPs for the interRAI home care assessment instrument**

Clinical issues	Functional performance
Falls	Physical activities promotion
Pain	Instrumental activities of daily living
Pressure ulcer	Activities of daily living
Cardiorespiratory conditions	Home environment optimisation
Undernutrition	Institutional risk
Dehydration	Physical restraints
Feeding tube	**Cognition/Mental health**
Prevention	Cognitive loss
Appropriate medications	Delirium
Tobacco and alcohol use	Communication
Urinary incontinence	Mood
Bowel conditions	Behaviour
	Abusive relationship
	Social life
	Activities
	Informal support
	Social relationship

Source: InterRAI home care assessment instrument.

The text of a CAP begins with a description of the problem/issue and provides information on epidemiology of the CAP target condition. This is followed by a statement of the overall goals of care and the items from the assessment that "trigger" the CAP, together with information about the estimated proportion of a care population who will trigger it. Box 3.2 shows an extract of a CAP from the interRAI HC. The final section provides care planning guidelines for the target condition and a list of references to publications that can be used as additional resources. The CAPs may

be used in their own right as a form of clinical guideline, or they may be used in conjunction with existing guidelines in any given jurisdiction. The interRAI assessment system, manuals and CAPs are themselves used as resources in general training of care professionals.

Box 3.2. Extract from the trigger for the CAP addressing potential for improving abilities in activities of daily living

Activities of daily living CAP trigger

The goal of this CAP is to improve performance or prevent avoidable functional decline in persons who already have some ADL deficits. The CAP applies to persons living in independent community housing, persons receiving services from home care programmes, persons in assisted living housing, and persons residing in nursing homes (long-stay care residents). The following rules specify the two types of persons triggered for specialised follow-up. A key difference between the two triggered groups is whether the person has a fluctuating functional status or condition at the initial assessment, often indicative of a person who has had a recent acute event.

Triggered to facilitate improvement

- Included in this group are persons who have all the following characteristics.
- Receive at least some help in ADLs (but are not totally dependent in all ADLs).
- Have at least some minimal cognitive assets (as indicated by having a Cognitive Performance Scale [CPS] score of less than six).
- Are not at imminent risk of dying.
- And, have two or more of the following indicators that suggest the person has experienced a recent acute event or has a fluctuating functional status, such as:
  - Experiencing an acute episode or a flare-up of a chronic condition.
  - Delirium.
  - Changing cognitive status (either improving or worsening).
  - Fluctuating care needs (with service supports either increasing or decreasing).

The quality indicators

The person-level data from interRAI instruments can be aggregated to inform decision making at the population level by managers, policy makers, planners, and evaluators (Mor et al., 2003a). Indicators of processes and outcomes of care are available for most established instruments in the interRAI suite, and they are a key application developed with any new instrument. In the nursing home sector, the initial set of quality indicators (QIs) created by Zimmerman and colleagues described a variety of quality problems that could be measured using the MDS-RAI, ranging from the prevalence of pressure ulcers to prevalence of untreated symptoms of depression (Zimmerman et al., 1995). These initial QIs included stratification criteria to provide basic differentiations of risk levels for adverse outcomes, and they had inclusion/exclusion criteria to identify the populations to which the indicator applied.

An extensive evaluation of QIs developed in the 1990s combined with new research on risk adjustment methodologies resulted in the release of updated quality indicators with more emphasis on longitudinal outcomes in nursing homes and post-acute care (Berg *et al.*, 2002; Mor et al., 2003a; Mor et al., 2003b). Rather than considering only the prevalence of indicators at a given point in time, these indicators emphasized changes in clinical status in areas that could potentially respond to intervention. A further refinement was additional enhancements to risk adjustment through direct standardisation of populations (Jones et al., 2010; Table 3.3). The newest QIs involved three levels of adjustment: *a)* use of inclusion and exclusion criteria to limit the application of the indicator to subgroups for whom the indicator would represent a true potential quality problem (e.g., persons at the end of life are excluded from many QIs because their changes in health are less likely to be a function of quality); *b)* individual level adjustment for related factors likely to lead to a higher or lower baseline rate of the indicator for reasons likely to be unrelated to quality (e.g., ADL problems related to locomotion are used as adjusters for falls); and *c)* computation of QI rates within strata of variables with strong associations with the indicator and then standardisation of facility populations using a fixed distribution of those strata as a reference (e.g., facility distribution of Case Mix Index values from the RUG-III classification system for comparing facilities with similar levels of dependency).

Table 3.3. **Examples of interRAI risk adjusted quality indicators for nursing homes**

Improvements in:	Presence of:
Mid-loss ADL (mobility, transfer)	Stage 2-4 pressure ulcers
Behaviour	**Occurrence of:**
Worsening of:	Falls
Mid-loss ADL	**Use of:**
Behaviour	Physical restraints
Bladder continence	Antipsychotics without related diagnosis
Mood	Catheter
Pain	Feeding tube

Source: InterRAI nursing home assessment instrument.

By 2004, interRAI had released a comparable set of QIs for home care settings (Hirdes et al., 2004; Table 3.4). Similar work is underway to extend QI development to acute care (Brand et al., 2011) and mental health settings (Hirdes et al., 2001).

Public reporting on nursing home QIs was first made available in the United States through the Nursing Home Compare website (*www.medicare.gov/NursingHomeCompare*); but the indicators reported include relatively basic risk adjustment strategies. In Canada, the Canadian Institute for Health Information (*www.cihi.ca*) and Health Quality Ontario (*www.hqontario.ca*) have collaborated to develop a web-based public reporting system that provides fully risk adjusted QI information to the public on all nursing homes in the province of Ontario.

Table 3.4. **Examples of home care quality indicators (QIs)**

Prevalence QIs	
Inadequate meals	Delirium
Weight loss	Negative mood
Dehydration	Disruptive/intense daily pain
No medication review by MD	Inadequate pain control
Neglect or abuse	Any injuries
ADL/rehab potential and no therapies	No flu vaccination
Falls	Social isolation with distress
Difficulty in locomotion and no assistive device	
Failure to improve/incidence QIs	
Bladder incontinence	Impaired locomotion in home
Skin ulcers	Cognitive function
ADL impairment	Difficulty in communication

Source: InterRAI home care assessment instrument.

The next stage in the evolution of performance measurement based on the interRAI assessment instruments is cross-national comparisons of quality. As these instruments begin to be adopted on a large scale internationally, the opportunity to perform "natural experiments" using population level data to compare health system performance will become possible. QIs from the interRAI Home Care instrument have been used to compare the performance of home care services in a pilot study in 11 European nations (Bos et al., 2007).

Casemix systems to describe resource use

Resource Utilisation Groups (RUGs) is a classification system that uses a subset of MDS-RAI assessment items to determine the relative cost of caring for a nursing home resident. RUGs is frequently used in payment systems to reimburse costs (Fries et al., 1994). The system of seven clinical categories was devised as a hierarchy ranked by cost. Residents can qualify for more than one group, but are placed in the most resource intensive one. A resident failing to fulfil the criteria for the rehabilitation groups would be checked against criteria for extensive treatments; those failing to meet the criteria would be checked against special care and so on. The reduced physical function group contains those residents who fail to meet the criteria for any of the other (Table 3.5). ADL (activities of daily living) scores, presence of depression and nursing rehabilitation needs are then assessed to allow subdividing of each of these clinical groups, to identify a final RUG group.

RUGs has proven to be an extremely robust system (Carpenter et al., 1997) and it is used in several nations as a basis of a payment system for funding long-term care, including the United States, Canada, Iceland and Finland. The aggregated data provide a powerful capacity to compare caseload complexity and service responses between facilities, regions and nations. The RUG system has also been shown to be effective in measuring casemix for persons receiving home care (Bjorkgren et al., 2000) and those with intellectual disability in institutional settings (Martin et al., 2011) Another casemix system has been developed for inpatient psychiatry (Hirdes et al., 2002b), and others are in development for sectors ranging from acute care to developmental services (Martin et al., 2011).

Table 3.5. **Criteria for allocation to main RUG-III categories**

Rehabilitation ↓	**Very high intensity multidisciplinary rehabilitation:** 450 minutes or more of rehabilitation therapy per week; and at least five days per week of one type of therapy; and at least two of the three therapies provided.
	High intensity rehabilitation: 300 minutes or more of rehabilitation therapy per week; and at least five days per week of one type of therapy.
	Medium intensity: 150 minutes or more of rehabilitation therapy per week; and at least five days per week of rehabilitation therapy.
	Low Intensity: 45 minutes or more of rehabilitation therapy per week; and at least three days per week of rehabilitation therapy; and at least two types of rehabilitation nursing, each provided five days per week.
	Note: Rehabilitation therapy is any combination of physical, occupational or speech therapy. Rehabilitation nursing includes: Amputation care, active/passive range of motion, splint/brace assistance; training in locomotion/mobility; dressing/grooming; eating/swallowing; transfer.
Extensive services ↓	**If the resident fails to fulfil these criteria, the next category is considered**
	ADL index score of at least seven and meet the following criteria: Parenteral feeding, suctioning, tracheotomy, ventilator/respirator.
Special care ↓	**If the resident fails to fulfil these criteria, the next category is considered**
	ADL index score of at least seven and meet at least one of the following criteria: Burns; coma; fever with vomiting, weight loss, pneumonia or dehydration; Multiple Sclerosis; pressure ulcers of stage 3 or 4; quadriplegia; septicaemia; IV medications; radiation treatment; tube feeding.
Clinically complex ↓	**If the resident fails to fulfil these criteria, the next category is considered**
	Meet at least one of the following criteria: Aphasia, aspiration, cerebral palsy, dehydration, hemiplegia, internal bleeding, pneumonia, stasis ulcer, terminal illness, urinary tract infection, chemotherapy, dialysis, four or more physician visits per month, respiratory therapy, transfusions, wound care other than ulcer care including active foot care dressing.
Impaired cognition ↓	**If the resident fails to fulfil these criteria, the next category is considered**
	ADL score of 4-10 and cognitive impairment in all three of the following: Decision making, orientation (recall), short-term memory.
Behavioural problems ↓	**If the resident fails to fulfil these criteria, the next category is considered**
	ADL scores of 4-10 and residents who display daily problems with the following: Inappropriate behaviour, physical abuse, verbal abuse, wandering, hallucinations.
Physical functions	**If the resident fails to fulfil these criteria, the final category is considered**
	Residents who do not meet any of the above criteria.

Source: InterRAI.

Cross-national comparisons of recipients of long-term care services

This section illustrates the potential of person level operational data to address matters of importance for evaluating and monitoring quality and efficiency of long-term care services. It uses data from a range of international research projects on interRAI assessment systems and data from nine of the many countries in which the interRAI system is in use. The data presented are selected to show how different components of the interRAI system described above could be used to show systematic differences between nations. The data are illustrative data from a range of implementations and are not presented as being representative of whole region or nation from which the data are derived.

Before analysing the data from the nine countries, this section reviews the results of two major EU-funded research projects that have used data collected from the interRAI system. This is illustrative of the potential for using data generated from assessment instruments to appraise the quality of care received by care users and to identify priority areas for intervention.

Results from two major European projects using interRAI instruments

These projects tested the reliability of the interRAI system in community care and nursing home care. The objective of the ADHOC study (Carpenter et al., 2004) of recipients of

community care services in 11 countries was to link the characteristics of community care recipients, the services they receive, and the outcomes they experience. In each country a cohort of 250 people receiving community care services were assessed using the interRAI HC assessment at baseline, six months and 12 months. Use of formal care services and amount of informal care were also recorded for the same period. The SHELTER study (Onder et al., 2012) assessed the reliability of the interRAI LTCF instrument in nursing home care when translated into the languages of eight participating EU countries and tested the implementation of the instrument on a large scale. 450 nursing home residents were assessed at baseline, six months and 12 months using the interRAI LTCF. Mortality, admissions to hospital and discharge from nursing home care were also recorded. In both studies data on configuration, staffing and models of management of the community and the nursing homes services was also recorded.

Figure 3.1 uses data from ADHOC and SHELTER to show how the community and nursing home care services of the nations that participated in both studies provide for people with very different degrees of cognitive and physical impairment. The axes in the graph show the degree of physical impairment using the interRAI ADL hierarchy scale and degree of cognitive impairment using the interRAI cognitive performance score (CPS). Both scales have a range zero (no impairment) to six (very severe impairment). The rectangular data points are the median values for recipients of community care (ADHOC) and the diamond shaped points, the median values for residents of nursing homes (SHELTER).

Figure 3.1. **Relationship between mean Cognitive Performance Scale score and mean ADL hierarchy scale score by country in the SHELTER (black) and ADHOC (grey) samples**
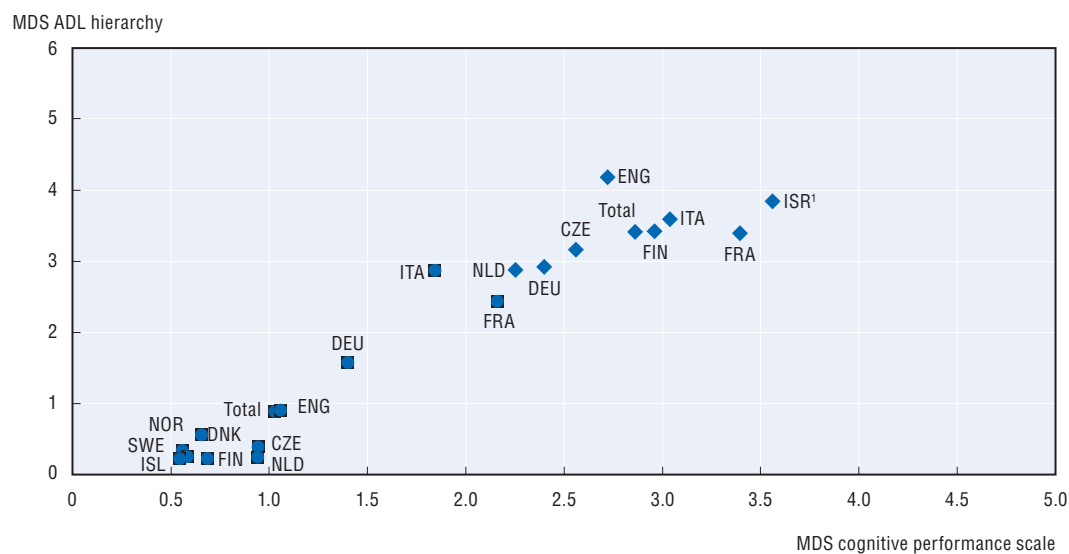
1. Information on data for Israel: *http://dx.doi.org/10.1787/888932315602*.
Source: ADHOC and SHELTER studies.

The community and nursing home populations are distributed in two distinct clusters, with the community populations in lower left of the chart having much lower levels of impairment than the nursing home residents in the upper right. While there are clear differences between the countries in each cluster, the populations in Italy (IT) and France (FR) are markedly different. The community care recipients in these two nations (the two rectangular data points at the lower left extremity of the cluster of diamond shaped data points on the upper right) have the same degree of impairment as the nursing home

population in the Netherlands (NL). Providing for such extremely dependent older people in their own homes must be due to different patterns of service provision and/or support of extended families. In either case, there are clearly lessons to be learned, as there will be significant differences between the eligibility criteria for access to services, and the financial and social costs of community and nursing home care.

The potential for insight into a wide range of clinical and social indicators requires only some processing of data from operational practices. For example, Figures 3.2 and 3.3 present further data from the nursing homes that participated in the SHELTER study.

Figure 3.2. **Pain and pain medication in residents with pain in nursing homes in eight EU countries**
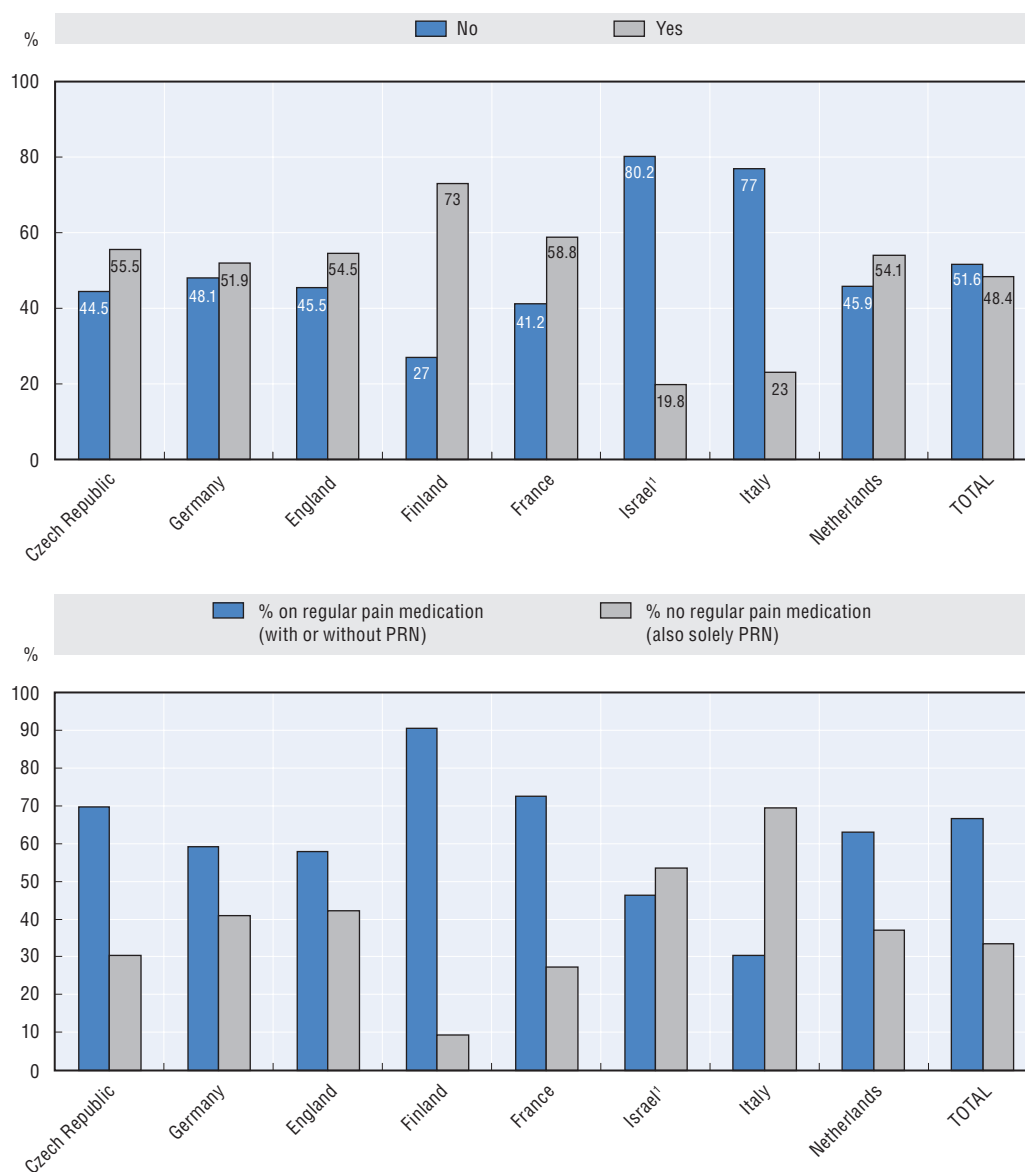
1. Information on data for Israel: *http://dx/doi.org/10.1787/888932315602.*
Source: SHELTER study.

Figure 3.2 shows the prevalence of pain and use of pain relieving medication. The upper graph shows the percentage of residents who complain of daily pain (lighter columns). The lower graph shows the percentage with pain who are not receiving regular pain relieving medication (pale section of each column). There are wide differences between countries, with 73% of nursing home residents in the Finnish sample (FI) reporting daily pain (light column upper graph), although only a small proportion are not receiving regular medication (pale column section in lower graph). In Italy (IT), just 23% of the residents of the participating homes reported daily pain (pale column in upper graph), but only 30% of these received regular pain relieving medication (dark column section in lower graph).

Figure 3.3 shows how the degree of social activity relates to physical disability and severity of dementia in the participating nursing homes. The upper graph shows how the degree of engagement in social activities reduces as physical disability increases for the resident in the homes from the United Kingdom and France. For the United Kingdom, the level of activity is higher than in the French homes across nearly all levels of disability, and falls more slowly with increasing disability than the SHELTER average. The lower graph

Figure 3.3. **Relationship between engagement in social activity physical and cognitive impairment in residents in nursing homes in eight EU countries**
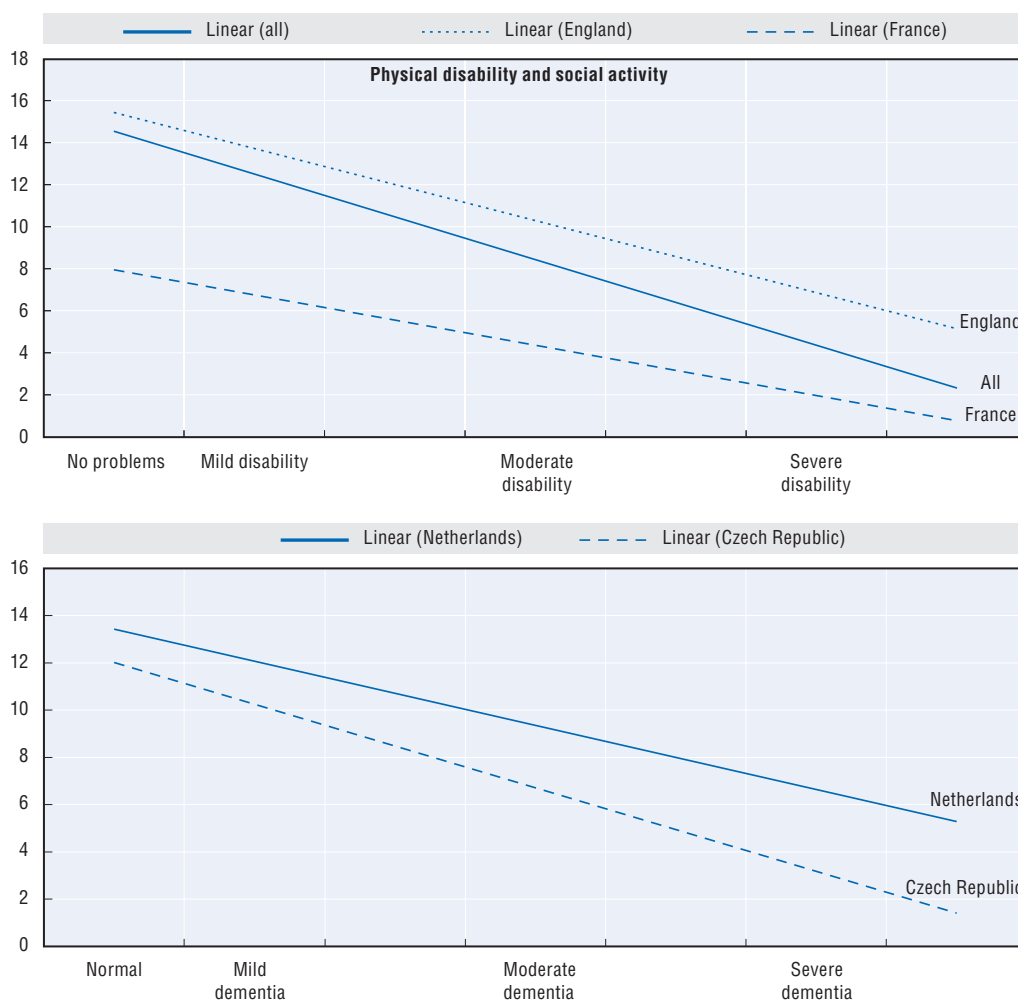
Source: SHELTER study.

shows reduction in social activity with increasing severity of dementia. However the slope of the line is less marked for the Netherlands, showing that the severity of dementia in the residents of the participating homes has a smaller impact on their participation in social activities than for those in the Czech Republic homes. Exploring the factors and management practices underlying these differences can increase knowledge and improve quality of care.

Data from nine OECD and non-OECD countries and regions

Data are shown from nine of the OECD and non-OECD countries and regions in which the interRAI assessment system is in use. The data are from interRAI fellows in the countries and regions that have contributed to this report: Ontario Province (Canada), Michigan State (United States), Iceland, Finland, Hong Kong (China), New Zealand, the United Kingdom, Belgium and Italy. In all of these countries except the United Kingdom, the data are derived from operational use of the interRAI assessment instruments for long-term care facilities (LTCF) and home (community) care (HC). The UK data are from the two EU-funded research projects conducted in South East England, ADHOC and SHELTER.

While countries like the United States and Canada have large data holdings for interRAI data, other nations such as Finland, New Zealand, and Belgium are well underway in their progress toward similar population level data, derived from the operational use of the interRAI assessment system. This report does not include direct comparisons of fully risk adjusted QIs, but it does provide some basic examples of stratified comparisons of potential quality issues in nursing home and home care settings.

**Box 3.3. Summary of use of the interRAI assessment system
in nine OECD and non-OECD countries**

There are national collections of InterRAI data in six of the countries, with one other country considering establishing a national collection. Quality indicators using InterRAI data are reported in Canada, the United States, and Iceland. This practice will begin in New Zealand in 2012. In other countries, the data are used internally, and for reimbursement.

Canada is able to cite use of InterRAI data as a basis for changing policy (e.g., changing service caps for homecare, prioritising access to services, and inclusion of casemix in funding formulas). The United States and Iceland have used InterRAI data to assess eligibility for care and for quality monitoring. Finland uses interRAI data in national reports on health and social care projects. Belgium also plans to use the data to support quality and reimbursement from 2013.

There are examples of the impact of changes in policy. The United States has examples of where use of interRAI data has led to substantial changes in cost structures for nursing home and home care. In the state of Michigan, the use of InterRAI data led to a reduction in duplicative care that resulted in a saving of USD 1 billion. In Canada, there has been a substantial reduction in the use of restraint in nursing homes following a quality initiative that built on InterRAI data.

InterRAI data are also used for regulatory purposes in Canada (e.g., in public reporting and nursing home inspection), and in the United States and Iceland.

Four countries provide the public with access to summary data or quality indicators. In the United States, summary data are available through a public website.

Iceland, Finland and New Zealand present data from the national data repositories. Michigan (entire state), Ontario (entire province), Italy (Umbria Region) and Hong Kong (China) present data from their entire region, with the exception that the HK nursing home data are from ten participating nursing homes. Belgium data come from pilot implementations prior to national deployment of the interRAI system; UK data are from the EU projects SHELTER (NH) and ADHOC (HC) only. The most recent deployments of Italy, Belgium and UK NH are data from implementations of the interRAI suite; the remainder are from implementations of the interRAI NH and HC versions 2.0.

The report represents the beginning of the opportunity to benchmark care internationally. The following sections reference tables listed in the annex.

Comparing demographics

Annex Table 3.A1.1 ("demographics worksheet") shows age, gender, marital status and prevalence of common clinical diagnoses in nursing home (NH) and home care (HC) populations. Both home care and nursing home settings serve a predominantly older, female population. All nations show the NH residents being marginally older than those cared for in the community, with the exception of Italy, where the age distribution is the same across both settings. Figure 3.1 showed how the levels of impairment in the community dwelling older people were remarkably similar to the NH residents in the other countries in the SHELTER study. There is likely something quite different about the way that NH and HC services are provided in Italy.

Women are more likely to not be married in both settings, and males in home care settings are generally more likely to be married than those in nursing homes. The lowest proportions of married people were in Finland (NH and HC) and the NH residents in Italy. This points to the importance of informal supports as a resource for maintaining older persons in the community, especially in Italy where the community dwelling older people are so dependent (see above in relation to Figure 3.1).

There are also clear differences in the diagnoses of persons in community and institutional settings. For example, the prevalence of Alzheimer's disease and related dementia is notably higher in nursing homes than in home care. The lowest NH prevalences are seen in Michigan, where there is a major initiative to provide increased care in the community, in Hong Kong (China) and in the United Kingdom. In the case of the United Kingdom, it could be simply that it is under-diagnosed in NH populations in spite of the high prevalence of cognitive impairment in the United Kingdom (McDonald et al., 2003). There are cross-national differences in the rates of diabetes (highest in Michigan of both populations and lowest in Belgium). However there are only modest differences in the rates of diabetes between the NH and HC settings within the same country. This demonstrates that some conditions are important risk factors for institutionalisation, whereas others may be managed effectively in either care settings. It also points to the importance of rising prevalence rates of dementia in many developed nations. Current approaches to community based care may not be sufficiently well equipped to deal with the rapidly growing population of people with cognitive impairment in later life.

Comparing casemix and quality indicators

Annex Table 3.A1.2 shows prevalence of triggered Client Assessment Protocols (CAP) that give an indication of the clinical syndromes requiring care planning in

both NH and HC settings. Table 3.A1.3 (Scales) shows the mean scores of some of the principal outcome scales that demonstrate the prevalence of functional impairment (cognitive performance and activities of daily living – ADL) and clinical syndromes (pain and depression).

Physical disability is an important area of need in both care settings cross-nationally. The ADL Hierarchy Scale (Morris et al., 1999) shows higher proportions of older people in the severe impairment groups in NH settings with more than 75% in the higher two groups (ADL Hierarchy scores 3-4 and 5-6) across all countries (Table 3.A1.3). The fact that a high proportion of NH residents trigger[3] the "ADL Prevent Decline" CAP (Table 3.A1.2) also implies that these residents are more physically impaired and less likely to benefit from physical rehabilitation in dressing, transferring between bed and chair, eating and mobility in bed (ADL Facilitate improvement CAP) than is the case in the HC populations. A striking difference is the high proportion of nursing home resident in Michigan that trigger "ADL Facilitate improvement". This is most likely as a result of policy in the United States which provides Medicare funding for rehabilitation in nursing homes, which likely enables earlier discharge from hospital with rehabilitation and discharge home from NHs. The fact that the "Delirium" CAP is also triggered in a greater proportion of Michigan NH residents (33.9% cf. <15% in all other countries except Italy – 24.8%) also suggests more acutely ill residents discharged from hospital to NH or possibly poor recognition of the critical clinical syndrome.

In addition, there are cross-national differences of note with the United Kingdom reporting about two-thirds of its nursing home residents to have the most severe levels of impairment compared with about one third in Hong Kong (China) and Canada. Similar patterns are evident with respect to cognitive impairment. These are likely to reflect differences in eligibility criteria for admission to NH between countries.

Use of physical restraints

Restraint use is an important issue with respect to quality in nursing homes. Table 3.A1.4 shows the percentage of residents triggering the "restraints" CAP in those who are relatively physically disabled and those with little physical disability. In most countries the CAP is triggered for more of the physically disabled (unable to perform early/mid loss ADLs – 13% to 25%) than the less disabled (able to perform early/mid loss ADLs – 1% to 3%). Rates of restraint use in the United Kingdom (0.6% and 0%) and the United States (0.3% and 1.1%) are substantially lower than in Canada (16% and 1.6%) and Hong Kong, China (20.7% and 3.5%). These differences are evident even though there has been a substantial *reduction* in restraint use in Canada in the last decade (see Figure 3.6). The differences between countries can only be explained by differences in policy and culture.

Depression

Depression (Annex Table 3.A1.3) is an important problem affecting the quality of life of older persons in community and institutional settings. However, a reasonably consistent pattern of more depression in nursing home settings is evident in most countries, except Hong Kong (China). For that country, the question of the adequacy and quality of home care services is important, particularly given the relatively lighter care needs of Hong Kong (China) home care clients. This finding is important given

the recognised phenomenon of under-detection of depression (Huang et al., 2011) and many may take for granted that sadness/depression in nursing home residents is normal. In other countries, policy makers must consider whether there are alternative strategies that may be used in nursing home settings to respond to or prevent the onset of depressive symptoms.

Pain

Pain (Annex Table 3.A1.2) is a pervasive problem affecting older persons around the world. The rates and severity of pain appear to be higher in home care settings; however, that may be associated with cross-sector variations in the severity of cognitive impairment (making pain more difficult to detect). In fact, in each country, the *minority* of home care clients report no pain. Therefore, effective pain management should be an important dimension of any country's strategy to improve the quality of life of older persons in the community.

Resource use

Casemix classification systems can provide summary information about the overall resource needs of health care service recipients. The RUGs system identifies those residents with higher and more complex care needs that make greatest demand on the skills and time of nursing care staff. By linking the RUGs system to payment systems, jurisdictions are able to direct funding to those with greatest need. Integral within the RUGs system is a linkage to good practice. Thus, the fact that it can take more time to support the good practice of enabling residents to, for example, dress themselves rather than care staff actually dressing the resident is recognised as "nursing rehabilitation" within RUGs, and is reflected in the casemix measure. Indicators of poor care are also embedded in the system, so that "gaming" the system to increase payments is difficult and not without consequences. In addition, statistical methods have been developed by interRAI researchers to identify dubious coding practices.

The Resource Utilisation Groups algorithms for nursing homes (RUG-III) and for home care (RUGIII/HC) have been extensively validated in cross-national studies of staff time use in those settings. The RUG algorithms differ somewhat between the two settings. Annex Table 3.A1.4 shows the distribution between the RUG system clinical groups of the nursing home (NH) and home care (HC) populations. These clinical groups are listed in the order of highest resource use (Rehabilitation) through to the lowest resource use group (Physical Function Reduced).

In all comparisons and all settings, the largest group of persons served are in the Physical Function Reduced RUG level, which includes persons with physical disabilities but few other medical complexities. The next most common groups are the impaired cognition and clinically complex groups. There are notable cross-national differences in the rehabilitation levels,[4] suggesting international variations in access to therapies, probably reflected in the funding available to provide care. There are also differences between home care and nursing homes with home care having larger proportions of persons in the clinically complex level but nursing homes having more in the somewhat more resource intensive special care level.

Despite the various differences that may be found with respect to specific RUG levels, perhaps the more interesting finding is the general *similarity* of RUG distributions

in nursing homes and home care settings. This implies that in most places the two sectors are serving a relatively comparable population with respect to clinical factors associated with resource use. It also suggests that other, *non-clinical* factors (e.g., social support) may be important differentiating factors determining who is in facility versus community settings.

Comparing sub-populations

Annex Table 3.A1.5 shows health and social care indicators within sub-populations in nursing home and community care across the nations. In this example, the data have been subdivided into four groups by degree of physical and cognitive impairment. The sub-groups are those with good physical function and good cognitive function, poor physical function but good cognitive function, poor physical function but good cognitive function and both poor physical function and poor cognitive function. The creation of the sub-groups is identical for both nursing home and community (home) care.

The prevalence of bladder incontinence as one would expect is higher in the "poor cognition" groups than "good cognition" groups. It is also higher in the "poor physical function" groups than the "good physical function" groups, with highest prevalence of all in those with both poor physical function and poor cognition. In addition there is a general pattern of bladder incontinence being higher in nursing home than home care populations in all sub-groups, with the exception of those with good physical function and poor cognition, where the pattern is reversed in all the country data, with the exception of the United Kingdom and Hong Kong (China). What is striking is that in Michigan, prevalence in home care is higher than any other country and greater than in nursing homes in all sub-groups. This could be of interest as it may reflect quality of care provision differences, or an impact of a policy decision that has an ill-understood or unexpected impact.

Use of physical restraints is highly related to culture and policy. Examining the data in Annex Table 3.A1.5, there is virtually no restraint use in any nation or in those people with good physical function and either good or poor cognition. However where there is poor physical function there are significant differences between nations. For those with poor physical function, but who still have good cognition, Finland (9.2%), Belgium (9.5%) and Hong Kong, China (19.2%) have the highest rates of use. In the most impaired group, the differences between nations are the greatest. In the United Kingdom (1%) and Michigan (2.7%), there is virtually no restraint use in those with poor physical and cognitive function. The rates in the other nations is much higher in this sub-group – Ontario (23.1%), Finland (18.7%), Belgium (19.9%), Italy 23.1%) and Hong Kong, China (54.2%). These differences can only represent differences in policy.

A further example of differences that stimulate thought, are in relation to the prevalence of feeling lonely. The highest rates of loneliness are seen in all the home care sub-groups in the United Kingdom and Belgium and Finland. In Belgium, a significant proportion of nursing home residents also feel lonely.

Falls

Falls are an important threat to the autonomy and well-being of older adults. As shown in Table 3.A1.5 in the annex, falls are more common in community settings (except in Italy) where exposure to risk and physical mobility is greater. Not all falls result in injury, and a

balance must be struck between maintaining mobility and independence and the risk of falling. Much can be done to reduce the risks associated with falling (OECD, 2007).[5] Routinely available comparable data highlights variations in incidence that permits exploration of different policies and practices associated with reduced risk of injury.

Longitudinal information and relation to policy

When longitudinal data are available from the routine use of interRAI assessments, it is possible to monitor quality of care and to evaluate the impact of policy decisions on the quality of care.

New Zealand introduced the interRAI home care assessment system in 2005. Straightforward aggregation of the assessment data and running of the quality indicator (QI) algorithms enables monitoring of the prevalence of quality indicators over time. Figures 3.4 and 3.5 present a selection of QI data from the national repository of data covering all home care assessments undertaken in New Zealand. Disaggregation by care provider or municipal district would enable benchmarking and comparison of performance.

Figure 3.4. **Selected quality indicators from home (community) care in New Zealand, 2005-12 (indicator list 1)**
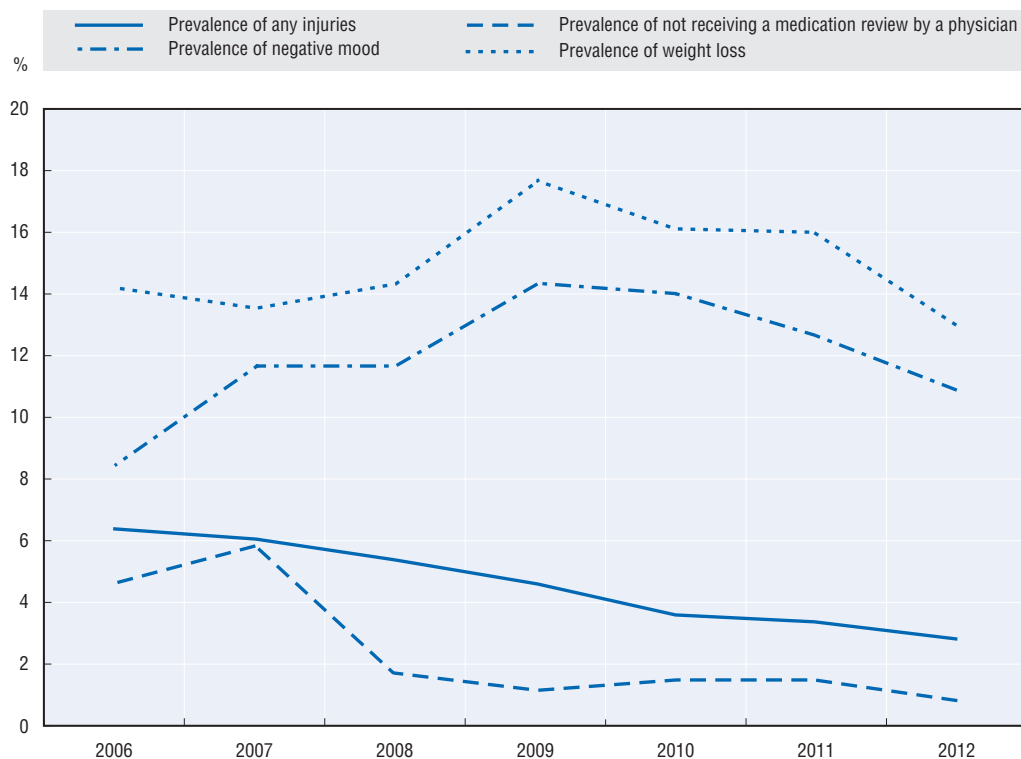
Source: National New Zealand interRAI Software Service (on behalf of New Zealand District Health Boards). Elaborated based on data from InterRAI.org.

Figure 3.5. **Selected quality indicators from home (community) care in New Zealand, 2005-12 (indicator list 2)**
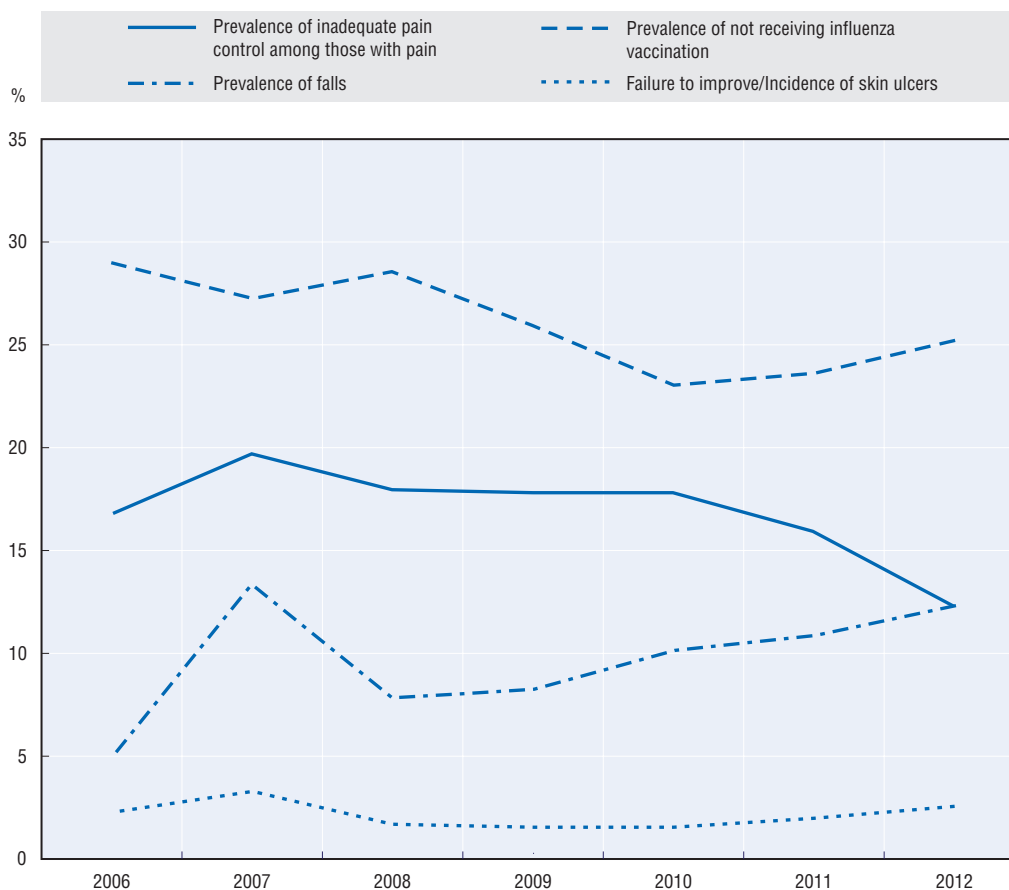
Source: National New Zealand interRAI Software Service (on behalf of New Zealand District Health Boards). Elaborated based on data from InterRAI.org.

In Canada, the use of restraints in nursing homes emerged as an important quality issue in the late 1990s, when international comparisons suggested that the rate of restraint use in that country was high by international standards (Feng et al., 2009). In a recent study funded by the Public Health Agency of Canada, longitudinal trends in restraint use were examined among Canadian provinces/territories that have implemented the interRAI nursing home instrument. Figure 3.6 provides clear evidence of substantial reductions in restraint use in four regions that reported their data to the Canadian Institute for Health Information. Two provinces had no major changes in restraint use, but their levels were already at the level to which other regions improved over time. Only one province (Saskatchewan) had a high rate of restraint use that remained effectively unchanged over a five year time period.

Figure 3.6. **Restraint use among nursing home residents without neurological conditions, by province, Canada, 1996-2010**
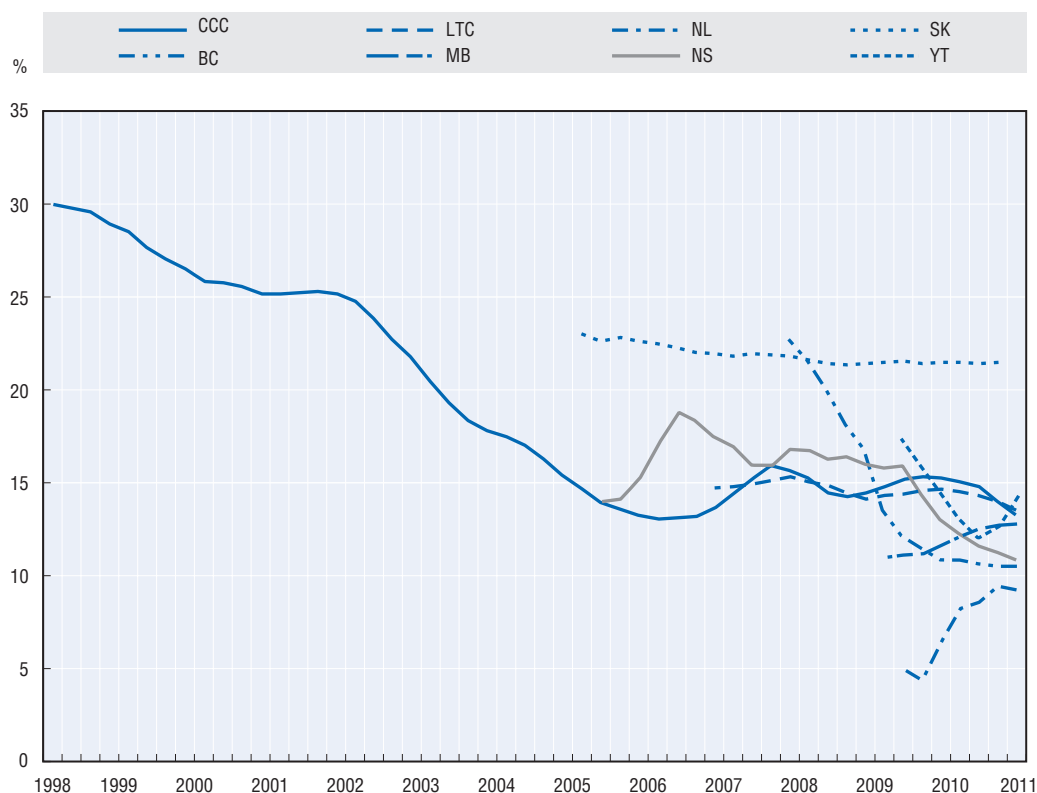
Note: BC: British Columbia; CCC: Ontario Complex Continuing Care Hospitals; LTC: Ontario nursing homes; MB: Manitoba; NL: Newfoundland and Labrador; NS: Nova Scotia; SK: Saskatchewan; YT: Yukon Territory.

Source: Canadian data set available from InterRAI.org.

The United States introduced policies to reduce admissions to nursing homes and limit admission to those with greatest need, through the Medicaid Waiver programme. Figure 3.7 shows the impact of these policies with a progressive reduction of the proportion of nursing home residents classified as "low care". These residents will typically have no complex clinical conditions and be relatively independent in their activities of daily living. The data in the figure are derived from completely reliable aggregations of MDSRAI assessments undertaken for care purposes and submitted to the national repository (*www.ltcFocus.org*).

Figure 3.7. **Percentage of long stay residents needing only limited care are in US nursing homes**
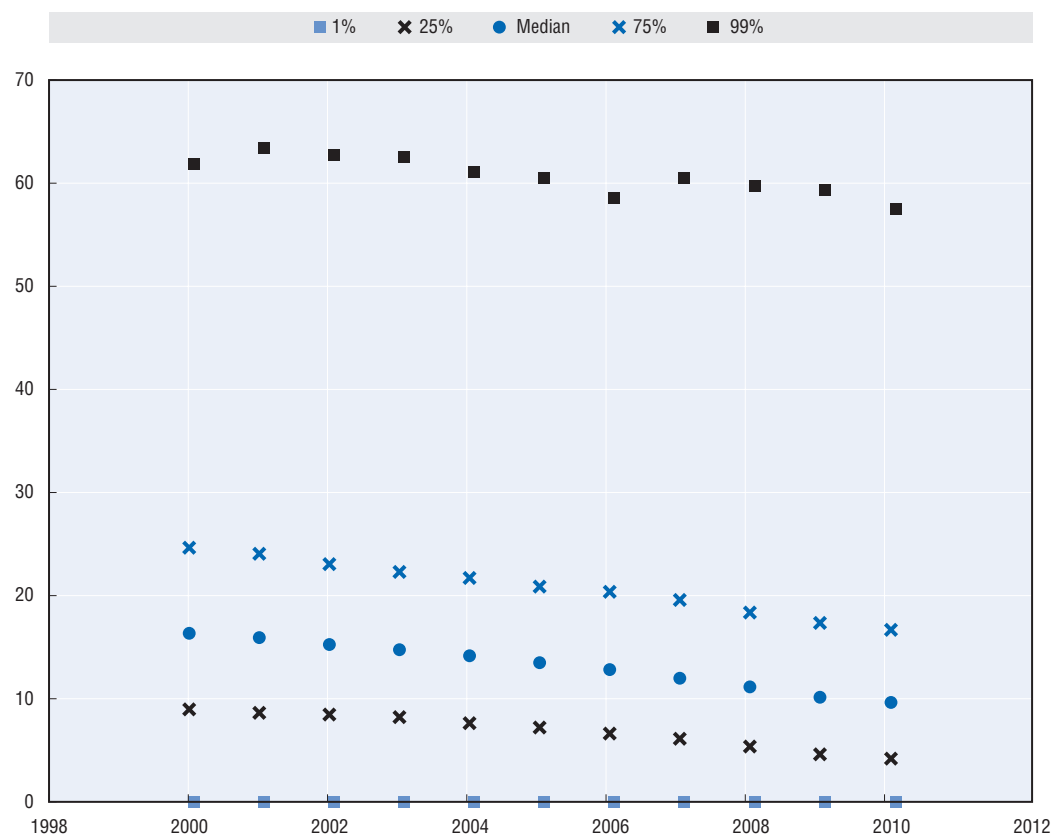
Source: www.ltcFocus.org.

Implementation issues and opportunities

The need to move toward evidence-informed decision making is a relatively uncontroversial proposition. The question is what conditions are required in order to implement solutions like the interRAI instruments on a large scale basis, as has been achieved in a number of countries including Canada, United States, New Zealand, Finland, Iceland, and currently underway in Belgium.

Political will, leadership and effective partnerships are essential. Decision makers often need information to address:

● policy challenges that lie ahead;

● clinical information for the entire jurisdiction;

● the needs of vulnerable populations across the continuum of care.

These can only be met by a common cross-sectoral information standard, without which all comparisons are subject to doubt and the evidence needed to inform decisions will be equivocal. This point is illustrated in the NHS Information Strategy for England which specifically addresses the importance of standards and comparable information in all aspects of health care (Department of Health, 2012).

However, to select and implement a single standard is a substantial political challenge because even if most agree with the decision, it is highly unlikely that all stakeholders will

support any single choice. The issues encompass consensus, technical issues, education and providing feedback to the care providers.

The nature of the challenge

Availability of integrated multi-setting person level data provides a wide array of opportunities for clinicians, administrators and researchers. This proposition is not unique to long-term care. It has been the focus of a major health informatics programme in the United Kingdom, led by the Health Informatics Unit at the Royal College of Physicians (*www.rcplondon.ac.uk/policy/improving-healthcare/health-informatics*) and is a major component of the EU eHealth interoperability roadmap (Calliope, 2011) for example. However achieving the goal of implementing a standardised integrated approach to assessment, such as the interRAI system, across whole jurisdictions presents challenges that are not insignificant. In 2003 the Millbank Memorial Fund published a series of case studies that illustrated the challenges of implementing the interRAI system in the United States, Canada, Iceland, Israel, Italy, Japan, Spain and the United Kingdom (Milbank Memorial Fund, 2003). Some of these countries have made significant progress (United States, Israel, Canada) but others remain embroiled in dialogue over models for assessment, funding and information management (e.g. United Kingdom). The report listed seven key issues that are still relevant today:

- It is difficult to introduce compatible, consistent assessment instruments across different systems and domains, each of which has a culture, history, and current approach to gathering and using information.

- The interRAI assessment system can be seen by persons in various professions as unnecessarily burdensome, less precise than existing instruments, too medically oriented, and an encroachment on the responsibilities of particular professions.

- The [interRAI assessment system] can be the basis for reimbursement based on nursing home residents' levels of acuity and thus disrupt the status quo in reimbursement.

- The introduction, maintenance, and full exploitation of a data system can only develop over time and with a significant expenditure of resources.

- Staff turnover impedes the consistent, continuing use of the instrument.

- The use of the [interRAI assessment system] is affected by such contingent factors as perceived crises that claim public attention.

- The [interRAI assessment system] can assist but not determine the judgment of policy makers.

The increasing pressures associated with ageing populations and constrained resources, together with the rapid development of information technology is leading to the development of models for successfully addressing the challenge.

Introducing new integrated assessment instruments across different systems and domains

The establishment of systems across regions, nations and care settings is likely to require significant political and administrative investment by governments. Specific services are often separately administered by different agencies under the jurisdiction of different levels of government – national, state, and regional. Even within one level of government, administrative "silos" can develop which attend to each service type (e.g., hospitals and community care). To further complicate matters, the health and social

service systems are frequently organised in their own administrative silos with belief and delivery models which may be perceived as being very different. Many elements of service systems may be provided by private agencies with varying levels of independence from government administration. Finally, the distribution of personal information across care settings, notably when the care is provided by different agencies, requires careful attention to privacy issues. Protocols are required to ensure that individuals are comfortable with the sharing of information among their caregivers.

The introduction of a single integrated clinical information system to such a complex mosaic of services thus seems formidable. However a number of nations and services have shown that full implementation is feasible.

Table 3.6. **Example of an interRAI assessment instrument section and assessment items**

SECTION C. COGNITION

1. COGNITIVE SKILLS FOR DAILY DECISION-MAKING

Making decisions regarding tasks of daily life – e.g., *when to get up or have meals, which clothes to wear or activities to do*

0. *Independent –* Decisions consistent, reasonable, and safe
1. *Modified independence –* Some difficulty in new situations only
2. *Minimally impaired –* In specific recurring situations, decisions become poor or unsafe; cues/supervision necessary at those times
3. *Moderately impaired –* Decisions consistently poor or unsafe; cues/supervision required at all times
4. *Severely impaired –* Never or rarely makes decisions
5. *No discernible consciousness, coma [Skip to Section G]*

2. MEMORY/RECALL ABILITY

Code for recall of what was learned or known

0. Yes, memory OK   1. Memory problem

a. **Short-term memory OK –** Seems/appears to recall after 5 minutes
b. **Long-term memory OK –** Seems/appears to recall distant past
c. **Procedural memory OK–** Can perform all or almost all steps in a multitask sequence without cues
d. **Situational memory OK –** Both: recognises caregivers' names/faces frequently encountered AND knows location of places regularly visited (bedroom, dining room, activity room, therapy room)

3. PERIODIC DISORDERED THINKING OR AWARENESS

[Note: Accurate assessment requires conversations with staff, family or others who have direct knowledge of the person's behaviour over this time]

0. Behaviour not present
1. Behaviour present, consistent with usual functioning
2. Behaviour present, appears different from usual functioning (e.g., new onset or worsening; different from a few weeks ago)

a. **Easily distracted –** e.g., episodes of difficulty paying attention; gets sidetracked
b. **Episodes of disorganised speech –** e.g., speech is nonsensical, irrelevant, or rambling from subject to subject; loses train of thought
c. **Mental function varies over the course of the day –** e.g., sometimes better, sometimes worse

4. ACUTE CHANGE IN MENTAL STATUS FROM A PERSON'S USUAL FUNCTIONING – e.g., *restlessness, lethargy, difficult to arouse, altered environmental perception*

0. No   1. Yes

5. CHANGE IN DECISION MAKINGCOMPARED TO 90 DAYS AGO (OR SINCE LAST ASSESSMENT)

0. Improved   2. Declined
1. No change   8. Uncertain

Note: Copies of interRAI instruments and manuals may be purchased by contacting interRAI at *http://catalogue.interrai. org/*. Instruments are copyright; however interRAI provides royalty-free use licenses to governments and caregivers.

Source: InterRAI.

An incremental approach to introduction is likely to be more successful than a blanket introduction across all care providers. Administrations operating two or more related services may introducing one of the instruments followed by a second and third (e.g., acute and post-acute care; community and institutional mental health). Services with relationships to the organisations that implement instruments may then see opportunities to improve sharing of interoperable data by implementing other instruments from the suite. Ultimately, the choice not to share instrumentation may place an organisation at considerable disadvantage (e.g., inability to avail themselves of the opportunity to benchmark their performance). This effect is likely to be particularly pronounced in adjacent health or social service sectors providing care to overlapping populations.

In New Zealand, the interRAI Home Care assessment system and interRAI Contact Assessment are used across all of community care. Introducing the LTCF assessment is being linked to the development of an information model for the interRAI system that will support interoperability of the data across computer systems of the full range of care providers. The New Zealand model of implementation was cited as an example of innovation in the NHS England Information Strategy 2012 (Department of Health, 2012). Other countries that have, or plan, advanced implementations of multiple instruments of the interRAI suite include Canada (Hirdes, 2006), Finland and Belgium.

Consensus

Reluctance to share instrumentation is also evident between health and social care disciplines, particularly in multi-disciplinary settings. Each professional group uses its own instrument set to evaluate aspects such as cognition, ADL and mood. There is often a division of labour in which each profession attends to aspects of the problem – medical staff to cognition, occupational therapists to functional activities, and nurses to pressure ulcer prevention. The introduction of a "shared" clinical dataset can be perceived to compromise the quality of instrumentation and threaten professional autonomy.

Conversely, the use of a shared dataset presents the opportunity to improving productivity through reduction in duplication of data recording, particularly if this information is linked to a wider system that brings previous data to the current setting, and offers an opportunity to efficiently pass on information to subsequent care settings.

The Canadian experience points to two important decision making dynamics. First, a consensus building process is often needed to reach a critical mass of opinion leaders of differing types (clinicians, administrators, researchers, policy makers) who will support the selection of a given information standard. Second, mandated use will ensure *full* implementation across all settings, including organisations that may be indifferent to or unsupportive of the recommendation. It is telling that the only province to recommend, but not mandate, use of the interRAI instruments (Nova Scotia) was not able to expand use beyond five opinion-leader homes.

Technical issues

InterRAI instruments are intimately dependent on computerisation, since an integral feature is a series of complex algorithms that generate scales, CAPs and numerous other administrative by-products. High quality, computer-based information systems are required to collect, compile and report on interRAI data to decision makers at all levels from the bedside to the minister's office. Paper based solutions are untenable, as are poorly designed

IT systems. Considerations that will affect data quality range from the human-computer interface at the clinical level to information standards for national databases. In addition, tools for on-going monitoring and correction of data quality issues (e.g., auditing systems, data submission standards, statistical controls). Information governance (including privacy, access to and secondary uses of interRAI information) need to be built into the implementation model from the start. Consent models for sharing and transmission of person identifiable data across care settings and between care professionals are increasingly available.

Thus, a major challenge to implementation is access to computers and the need for a reasonable degree of computer literacy among front line staff. Many service settings are not yet ready for this level of sophistication, and see investment in computerisation as a significant cost barrier. However, as the benefits of such systems grow and with the development of lower cost web based solutions, the development of the formal interRAI information model and the increasing availability of cheaper computer hardware, the case for investment in these capabilities become increasingly powerful.

Education and training

Education is another core requirement for successful implementation. This includes training on the technical task of completing assessments correctly, but it also includes: education to support transitions to a culture of evidence, role modelling on collaborative exchange and use of data to inform decision making, and training on the use of interRAI's decision support algorithms address clinical, service delivery and policy related questions. The educational strategy must be multidimensional (e.g., in-person education, e-learning solutions, workshops, conferences), dynamic (to change with evolving learning needs), and ongoing (e.g., to deal with staff turnover, emergence of new evidence or applications).

Feedback to care providers

Feedback is a critical requirement at all levels of implementation. The required cycle times for feedback vary depending on the information user and the application of the information. For example, clinicians should receive virtually instantaneous feedback on the results of the person's assessment in order to initiate care planning and interventions in a timely manner. Managers require information on a somewhat longer time period to support internal administrative decisions and for governance purposes (e.g., reports to boards of directors). Governments may find a quarterly to annual information cycle adequate to inform population level decisions and public accountability. Despite the different time frames for feedback, each of these levels of consumers must see a "payback" of evidence arising from the investments made to gather these data.

Data quality

Continually monitoring, evaluating and protecting data quality is important. The maintenance of data quality is a continuous responsibility for all stakeholders and it can be addressed through a variety of educational and technical strategies. The fact that assessment data is generated at the interface between the patient/resident/care recipient, for the purpose of day to day care planning and delivery is itself a powerful driver for data quality.

Conclusions

Ageing and its associated chronic diseases and disability will be one of the major global challenges of this century. Almost all middle and high income nations are experiencing growth in the size of the older population, and the rate of population ageing is accelerating as birth rates and mortality rates decline. The availability of high quality evidence to inform policy development will be an essential resource to governments at all levels. It is not possible to monitor or improve quality of care without being able to measure and compare progress over time or performance between organisations, regions or nations. Assessment instruments such as the interRAI family of assessment instruments provide a unique, scientifically sound evidence base that can provide insights into the service needs, quality of care, and impact of policy choices on vulnerable persons across the continuum of care.

This chapter has described the history, scope and use of the interRAI assessment system. It also presented data illustrating how standardised person level data, recorded for the purpose of care planning and provision of care, can be aggregated to compare quality of care and efficiency of care services. Data from cross-national studies illustrate how only person level data (as opposed to service level data) can provide comparisons of the characteristics of nursing home and community care service populations and how these same data provide information on quality indicators of health and social care. Comparisons have illustrated differences that suggest improved outcomes can be achieved by examining policies and practices across organisations, regions and nations.

Standardisation of assessment in routine care practice is the most efficient means of delivering both high quality care and performance data. Standardising assessment and implementing sophisticated technologies such as the interRAI system on a large scale has the potential for huge transformational change. It is a significant undertaking that requires political commitment and presents a significant challenge. This chapter has described the nature of the challenge, highlighting the importance of overcoming interdisciplinary defensiveness and reluctance to change practice, commitment to generating reliable evidence to inform policy and investing in training, education and feedback to the care professionals and managers whose practice is required to change. There are also essential technology requirements. Investing in appropriate IT infrastructure seems an expensive investment. However it is probable that in the face of demographic change and financial pressure, it is only developing technology that is likely to deliver year on year improved efficiencies in service organisation and delivery.

Currently it would appear that the interRAI technology is unique in the depth and breadth of assessment and the well developed products in the form of quality, outcome and resource use indicators. All constructed entirely on the basis of supporting care professionals in assessing care needs and developing plans and delivering care. However great the challenge, governments must address the transformational change of introducing technology of this nature. OECD countries and regions' data used in this chapter demonstrate that this is feasible.

HL7 is the standard for the safe transmission of computerised clinical messages and the coded clinical information they contain. Health Level Seven International (HL7 – *www.hl7.org*) is the global authority that maintains and develops the HL7 standards. SNOMED CT is the international coding standard for clinical terminology that enables recording, transmission and retrieval of clinical information in a coded digital format. The International Health Terminology Standards Development Organisation (IHTSDO –

www.ihtsdo.org) is an international organisation with nation stake holders, created to support and develop – SNOMED CT. For functional assessment of care needs and the reliable use of valid comparable person level data, the interRAI assessment technology is the uniquely powerful system that delivers a full range of reliable aggregatable data from the day to day care of vulnerable populations. A move from an informal collaboration to a more formal international organisation such as IHTSDO will help manage the care challenges of population ageing.

Box 3.4. Suggestions for countries considering the use of standardised assessment systems

1. Foster a culture of evidence-informed decision making and a shared commitment to high data quality: the introduction of standardised assessment instruments with the sophisticated associated constructs (such as outcome scales, quality indicators and casemix systems) can provide a foundation of evidence to inform decision making; however, the use of evidence in this way itself requires a cultural shift at all levels of health and social service delivery. The protection of the quality of evidence must become a fundamental concern for all stakeholders investing in the implementation of these systems.

2. Engage a broad range of stakeholders as "consumers" of information from standardised assessment generated from routine practice: the key value of the interRAI assessments lies not in the collection of data, but rather the application of those data to create evidence that different stakeholders can use immediately to inform their decisions. Operational person level data should become a major source of evidence for decision makers at "the bedside" through to their counterparts in government. The information will also be of interest to patients, residents and other service users as they review their own care and compare quality of care across care providers. The engagement of these stakeholders supports improved data quality and cost-effectiveness for the implementation investment.

3. Integrate the assessment systems into normal clinical and social care practice: interRAI assessments should replace redundant systems and those with weak psychometric evidence as the required standard assessment approach for service recipients.

4. Invest in good quality IT systems to support data collection, reporting and information exchange: poorly designed computer systems can have profound negative consequences for any implementation effort. In addition to basic considerations related to the human-computer interface for a given solution, it is important that the system is able to process data into meaningful information to support the care professional in day to day work as well as providing performance data. In the case of the interRAI system this means all the major interRAI applications (e.g., care planning, outcome measures, quality indicators, casemix) across sectors and over time for individuals.

5. Employ the suite of instruments across adjacent sectors: although it may not be feasible to implement *every* instrument in a short period of time, health and social service providers serving overlapping populations (e.g., home care and nursing homes) should adopt instruments with interoperable data.

> Box 3.4. **Suggestions for countries considering the use
> of standardised assessment systems** (*cont.*)
>
> 6. Ensure that information feedback loops are responsive to stakeholders' needs: clinicians should get virtually instantaneous results from having completed an assessment, but these results should be shared among all colleagues in the "circle of care" in a timely manner. Similarly, aggregated data should be available to support decisions related to governance, regulation and policy development as those decisions are being formulated.
>
> 7. Promote transparency in the use of data: evidence should be available to all decision makers including consumers, clinicians, managers, administrators and policy makers. Transparency supports "buy-in" to the introduction of these systems, enhances data quality, identifies best practices and industry leaders, helps to establish appropriate quality targets, and fosters and diffuses innovations through collaborative quality improvement initiatives.
>
> 8. Use casemix applications based on person level data to support appropriate allocation of limited resources to those most in need: in any economic circumstance, but particularly when resources are constrained by economic pressures, needs based solutions to funding through proven casemix methodologies provide an equitable approach to resource allocation.

Notes

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2. InterRAI instruments are intimately dependent on computerisation, since an integral feature is the suite of complex algorithms that generate scales, assessment protocols, resource use casemix products etc. Some software packages developed to deliver the interRAI system include full care planning, rostering and staffing tools and links to knowledge databases, features that are not interRAI products.

3. Trigger – have assessed care needs that trigger a CAP which draws the attention of the care provider to a matter that should be considered in the care plan and provides guidance on the specific issues that should be addressed

4. Some of the differences between United States and other nursing home sites regarding the RUGs distribution may be a function of the US sampling strategy, which would favour new admissions that tend to receive more post-acute care services.

5. The goals of care are specified in the interRAI Falls CAP: Identify and change underlying risk factors for falls; Promote activity in a safe manner and in a safe environment. Recognise common pathways among falls, incontinence, and functional decline. Fall prevention is not an isolated goal but part of a larger objective of promoting physical activity and improved quality of life.

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ANNEX 3.A1

Reference tables from nine OECD and non-OECD countries and regions using interRAI

Table 3.A1.1. **Demographics/Demographic data and prevalence of common diseases in nursing home (NH) and home (community) care (HC) populations**

Characteristic	Ontario, Canada		Michigan, United States		Iceland		Finland		United Kingdom		Belgium		Italy		Hong Kong, China		New Zealand	
	NH	HC	NH	HC	NH	HC	NH	HC	NH	HC	NH	HC	NH	HC	NH	HC	NH	HC
	(N=90 115)	(N=w152 558)	(N=83 893)	(N=14 621)	(N=2 307)	(N=)	(N=5 699)	(N=13 041)	(N=481)	(N=250)	(N=765)	(N=4 070)	(N=3 661)	(N=2 417)	(N=3 016)	(N=103 001)	(N=)	(N=11 163)
	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%
Female	69.9	65.3	67.0	69.5	66.1	–	73.4	71.8	72.1	74.4	75.9	68.4	69.4	63.5	65.3	–	–	60.3
Age group																		
< 65	6.2	17.5	13.6	25.9	2.6	–	4.1	9.5	4.2	0	4.3	5.6	4.7	8.2	3.7	–	–	4.7
65-74	9.4	14.9	16.2	21.4	7.8	–	11.6	13.3	10.6	18.3	10.4	16	11.2	11.1	19.2	–	–	18.4
75-84	32.1	34.2	32.7	31.1	31.3	–	34.8	39	33.7	41.9	38.6	48.5	37.1	37.4	38.8	–	–	43.6
85+	52.3	33.5	37.5	24.0	58.3	–	49.5	38.2	51.6	39.8	46.7	29.9	47.1	43.4	38.4	–	–	32.4
Married																		
Male	42.9	58.3	44.1	34.5	37.8	–	–	50.7	37.3	41.9	42.5	59.8	32.1	65	56.2	–	–	–
Female	16.0	28.5	20.0	17.2	17.8	–	–	49.3	11.2	15.3	12.6	27.3	11.7	25.7	15.1	–	–	–
Both sexes	24.1	38.8	27.9	22.4	19.5	–	15.7	17.6	18.5	22.1	19.7	37.6	17.8	40.1	29.4	–	–	37
Diagnosis																		
Alzheimers disease or other dementia	56.3	19.3	38.1	25.1	62.1	–	64.7	29.9	30.9	12.1	46.4	15.6*	53.3	33.5	25.1	21.4	–	21
Heart failure	12.4	11.4	27.0	30.6	16	–	13	19.5	6.4	20.4	28.2	9.9	13.3	25	9.6	18.1	–	17
Emphysema or other chronic obstructive pulmonary disease (COPD)	14.4	16.9	23.0	23.6	10.2	–	4.2	11.2	6	13.5	9.7	4.2	19.9	17	5.5	11.2	–	19

Table 3.A1.1. **Demographics/Demographic data and prevalence of common diseases in nursing home (NH) and home (community) care (HC) populations** *(cont.)*

Characteristic	Ontario, Canada		Michigan, United States		Iceland		Finland		United Kingdom		Belgium		Italy		Hong Kong, China		New Zealand	
	NH	**HC**	**NH**	**HC**	**NH**	**HC**	**NH**	**HC**	**NH**	**HC**	**NH**	**HC**	**NH**	**HC**	**NH**	**HC**	**NH**	**HC**
	(N=90 115)	(N=w152 558)	(N=83 893)	(N=14 621)	(N=2 307)	(N=)	(N=5 699)	(N=13 041)	(N=481)	(N=250)	(N=765)	(N=4 070)	(N=3 661)	(N=2 417)	(N=3 016)	(N=103 001)	(N=)	(N=11 163)
	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%
Diabetes	25.0	26.3	33.9	37.4	14.1	–	18	26	14.8	14.2	18	10.3	21.7	19	24.1	25.9	–	19
Cancer	8.9	15.0	8.7	9.9	8.5	–	7.1	6.9	12.7	6.6	7.4	4.7	10.2	15.1	5.4	6.7	–	11.1
Stroke	21.2	17.0	15.9	22.5	22.7	–	10.5	8.2	26.4	25.3	19.8	12.3	20.7	15.8	29.1	32.0	–	18

Note: For the Belgian nursing home (NH) data, about 20% of cases have missing values for diagnosis. For those cells, rates are computed based on non-missing cases only. This table offers a demonstration of potential for cross-national comparisons using data from the interRAI assessment system in nine OECD and non-OECD countries.

Source: New Zealand: National New Zealand interRAI Software Service (on behalf of New Zealand District Health Boards); Belgium: BelRAI-data, Federal Public Service Health, Food chain safety and Environment; Iceland: The Icelandic data is on all skilled NH´s in Iceland from a national data base on NH care, as per MDS 2.0. The supervisor of the data base is the Director General for Health in Iceland and the data base is maintained by Stiki ehf, data warehouse company; Italy: Italy are obtained from the Umbria region; Michigan, United States: Nursing home: from Michigan MDS 2.0 – the federally mandated assessment instrument for nursing homes – for 10/1/09 – 9/30/10); Home care: Michigan Home- and Community-Based Waiver interRAI HC data – the State-run community-based home care program (MI CHOICE) for persons in need of care at the nursing home level (Calendar year 2010); Hong Kong, China: RAI-HK HC data, SWD Elderly Services, HK SAR Government.

Table 3.A1.2. **CAPs (Client Assessment Protocols)/Prevalence of clinical syndromes as indicated by the prevalence of triggered CAPs in nursing home (NH) and home (community) care (HC) populations**

Clinical assessment protocol	Ontario, Canada		Michigan, United States		Iceland		Finland		United Kingdom		Belgium		Italy		Hong Kong, China		New Zealand	
	NH	HC	NH	HC	NH	HC	NH	HC	NH	HC	NH	HC	NH	HC	NH	HC	NH	HC
	(N=90 115)	(N=152 558)	(N=83 893)	(N=14 621)	(N=)	(N=)	(N=5 699)	(N=13 041)	(N=481)	(N=250)	(N=765)	(N=4 070)	(N=3 661)	(N=2 417)	(N=3 016)	(N=103 001)	(N=)	(N=)
	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%
ADL CAP																		
Facilitate improvement	30.6	13.2	69.1	23.3	–	–	36.0	15.8	18.3	15.6	29.4	25.9	27	30.1	4.0	7.3	–	–
Prevent decline	44.2	22.7	24.1	28.8	–	–	39.0	11.6	52.6	0	34.3	9.8	45	28.6	42.1	38.9	–	–
Communication CAP																		
Facilitate improvement	11.1	6.8	17.4	5.6	–	–	9.1	12.4	10.6	3.4	8.1	8.6	6.7	10.7	8.1	7.7	–	–
Prevent decline	23.0	11.6	6.1	17.9	–	–	31.1	13.9	23.1	16.9	27.3	13.1	25.8	19.7	10.6	0.4	–	–
Delirium CAP	10.1	1.9	33.9	4.1	–	–	7.4	5.1	14.8	9	15.6	15.8	24.8	26.6	3.8	3.4	–	–

Table 3.A1.2. **CAPs (Client Assessment Protocols)/Prevalence of clinical syndromes as indicated by the prevalence of triggered CAPs in nursing home (NH) and home (community) care (HC) populations** *(cont.)*

Clinical assessment protocol	Ontario, Canada		Michigan, United States		Iceland		Finland		United Kingdom		Belgium		Italy		Hong Kong, China		New Zealand	
	NH	HC	NH	HC	NH	HC	NH	HC	NH	HC	NH	HC	NH	HC	NH	HC	NH	HC
	(N=90 115)	(N=152 558)	(N=83 893)	(N=14 621)	(N=)	(N=)	(N=5 699)	(N=13 041)	(N=481)	(N=250)	(N=765)	(N=4 070)	(N=3 661)	(N=2 417)	(N=3 016)	(N=103 001)	(N=)	(N=)
	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%
Restraints CAP																		
Unable to perform early/ mid-loss ADLs	16.0	n.a.	0.3	n.a.	–	–	22.3	n.a.	0.6	n.a.	13.5	n.a.	16.1	n.a.	20.7	n.a.	–	–
Able to perform early/ mid-loss ADLs	1.6	n.a.	1.1	n.a.	–	–	2.4	n.a.	0	n.a.	1.8	n.a.	1.6	n.a.	3.5	n.a.	–	–
Cardiorespiratory CAP	11.6	40.5	15.1	53.5	–	–	27.0	47.0	18.1	38.2	37.5	38.4	39	53.5	8.3	33.5	–	–

Notes: The ADL CAP (Activities of Daily Living Client Assessment Protocol): triggered where there is potential to improve performance or prevent avoidable functional decline in persons who already have some ADL deficits. Examples of the characteristics of those who are in the "Facilitate improvement" group are shown in Box 3.2 of the report. The aim of care for these resident is *a)* to manage the new onset acute problem and work to return the person to his or her pre-acute functional level and *b)* watch to ensure the person does not enter a cycle of spiraling ADL decline. Persons who are in the "Prevent decline" group have the attributes listed in Box 3.2, but only one of the ten clinical items is present. The principal approach to care for these residents is *a)* Institute a plan of care to help the person preserve current ADL self-sufficiency levels and *b)* to watch for the onset of acute health problems or new medications that could drive ADL decline (for example, delirium, change in cognition, pneumonia, new hospitalisation) and treat or respond in the earliest phase. The onset of such acute problems will be the principal force that drives functional decline in the months ahead

Communication CAP: Triggered where there is potential to work to improve communication ability or prevent avoidable communication decline.

Delirium CAP: Triggered when a person has active symptoms of delirium.

Restraints CAP: Identifies persons who are physically restrained. Those in the "Unable to perform early/Mid-loss ADLs" group (e.g. personal hygiene, dressing, and walking) are more likely to have a history of falls and behavioural problems than the subgroup not triggered. About 70% of these persons have severe cognitive loss and a like number are unable to walk or use a wheelchair. About 40% will be unable to sit upright on their own, over one-quarter will have severe problems in seeing or understanding others, and about 15% will be tube fed. With effective restraint reduction programmes, few, if any, such persons will require restraints. Those in the "Able to perform early/mid loss ADLs" group tend to be restrained because of concerns about falling, wandering, and behavioural problems (for example, resisting care, physical abuse, or socially inappropriate behaviour). About one in five restrained persons will fall into this group. Organisations with effective restraint reduction programmes have been able to eliminate restraints in caring for such persons.

Cardiorespiratory CAP: Alerts the health care professional to the need to assess and manage the person for possible cardiovascular or respiratory problems.

This table offers a demonstration of potential for cross-national comparisons using data from the interRAI assessment system in nine OECD and non-OECD countries.

Source: New Zealand: National New Zealand interRAI Software Service (on behalf of New Zealand District Health Boards); Belgium: BelRAI-data, Federal Public Service Health, Food chain safety and Environment; Iceland: The Icelandic data is on all skilled NH´s in Iceland from a national data base on NH care, as per MDS 2.0. The supervisor of the data base is the Director General for Health in Iceland and the data base is maintained by Stiki ehf, data warehouse company; Italy: Italy are obtained from the Umbria region; Michigan, United States: Nursing home: from Michigan MDS 2.0 – the federally mandated assessment instrument for nursing homes – for 10/1/09 – 9/30/10); Home care: Michigan Home- and Community-Based Waiver interRAI HC data – the State-run community-based home care program (MI CHOICE) for persons in need of care at the nursing home level (Calendar year 2010); Hong Kong, China: RAI-HK HC data, SWD Elderly Services, HK SAR Government.

I.3. USING INTERRAI ASSESSMENT SYSTEMS TO MEASURE AND MAINTAIN QUALITY OF LONG-TERM CARE

Table 3.A1.3. **Scales/Physical impairment, cognitive impairment, severity of depressive symptoms and severity of pain in nursing home (NH) and home (community) care (HC) populations**

Scale name	Ontario, Canada		Michigan, United States		Iceland		Finland		United Kingdom		Belgium		Italy		Hong Kong, China		New Zealand	
	NH	HC	NH	HC	NH	HC	NH	HC	NH	HC	NH	HC	NH	HC	NH	HC	NH	HC
	(N=90 115)	(N=152 558)	(N=83 893)	(N=14 621)	(N=2 307)	(N=)	(N=5 699)	(N=13 041)	(N=481)	(N=250)	(N=765)	(N=4 070)	(N=3 661)	(N=2 417)	(N=3 016)	(N=103 001)	(N=)	(N=11 163)
	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%
Cognitive performance scale																		
0	15.2	44.4	34.6	33.2	4.9	–	4.9	35.0	21.4	52.6	17.7	41.5	7.6	24.2	36.0	10.3	–	38.3
1-2	26.4	44.2	26.3	40.3	17.6	–	16.8	37.6	28.5	26.3	21.6	27.3	30.4	27.3	26.9	83.0	–	31.6
3-4	33.4	7.3	30.2	15.9	30.1	–	35.5	21.8	20.8	9.3	33.6	20.9	21.5	14.0	18.4	5.0	–	25.1
5-6	25.0	4.2	8.8	7.5	47.4	–	42.8	5.7	29.5	8.0	27.1	10.3	40.5	34.5	18.6	1.7	–	5.0
ADL hierarchy																		
0	7.9	62.6	2.3	41.3	–	–	2.8	72.2	6.9	67.8	7.9	23.4	5.6	10.6	42.5	53.7	–	65.3
1-2	17.1	24.0	19.0	26.6	–	–	15.2	17.7	ore	11.1	12.8	24.4	16.1	8.4	12.0	38.0	–	22.3
3-4	38.2	10.0	57.1	20.3	–	–	28.7	8.4	20.8	16.6	46.8	41.1	31.6	27.6	12.1	7.6	–	9.3
5-6	36.8	3.4	21.6	9.6	–	–	53.4	1.8	64.7	4.5	32.5	11.1	46.6	53.5	33.4	0.8	–	3.1
Depression rating scale																		
0	34.1	60.5	61.3	60.6	33.4	–	35.0	62.9	39.3	>2	31.1	46.1	37.9	49.9	83.2	64.8	–	60.5
1-2	33.0	23.1	29.8	24.0	42.1	–	34.1	20.9	28.3	26.3	30.3	24.6	28.1	20.3	13.6	27.6	–	23.4
3+	32.9	16.4	8.8	15.4	24.5	–	30.9	16.3	32.2	g	38.6	29.3	34.0	29.8	3.3	7.6	–	16.1

Table 3.A1.3. **Scales/Physical impairment, cognitive impairment, severity of depressive symptoms and severity of pain in nursing home (NH) and home (community) care (HC) populations** (cont.)

Scale name	Ontario, Canada		Michigan, United States		Iceland		Finland		United Kingdom		Belgium		Italy		Hong Kong, China		New Zealand	
	NH	HC	NH	HC	NH	HC	NH	HC	NH	HC	NH	HC	NH	HC	NH	HC	NH	HC
	(N=90 115)	(N=152 558)	(N=83 893)	(N=14 621)	(N=2 307)	(N=)	(N=5 699)	(N=13 041)	(N=481)	(N=250)	(N=765)	(N=4 070)	(N=3 661)	(N=2 417)	(N=3 016)	(N=103 001)	(N=)	(N=11 163)
	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%
Pain scale																		
0	57.5	32.4	39.8	28.4	24.5	–	51.0	38.7	63.2	29.4	ges	50.0	77.9	63.5	72.4	48.8	–	40.4
1-2	39.6	53.8	56.1	51.0	63.9	–	45.6	53.9	34.1	51.6	37.0	40.6	20.2	31.0	21.5	46.6	–	45.9
3	3.0	13.8	4.0	13.5	11.6	–	3.3	7.5	2.7	19.0	4.3	9.3	1.9	5.5	6.1	4.6	–	13.7

Cognitive Performance Scale: Combines information on memory impairment, level of consciousness, and executive function, with scores ranging from 0 (intact) to 6 (very severe impairment). Scores of 3 or greater indicate likely presence of dementia (*www.interrai.org/assets/files/Scales/Cognitive%20Performance%20Scale.pdf*).

ADL (activities of daily living) hierarchy groups activities of daily living according to the stage of the disablement process in which they occur. Early loss ADLs (for example, dressing) are assigned lower scores than late loss ADLs (for example, eating). The ADL Hierarchy ranges from 0 (no impairment) to 6 (total dependence). (*www.interrai.org/assets/files/Scales/ADL%20Hierarchy.pdf*).

Depression rating scale: Used as a clinical screen for depression. Scores of 3 or greater indicate likely presence of major or minor depressive disorders (*www.interrai.org/assets/files/Scales/Depression%20Rating%20Scale.pdf*).

Pain scale: Uses two items to create a score from 0 to 3. It has been shown to be highly predictive of pain as measured by the Visual Analogue Scale (*www.interrai.org/assets/files/Scales/Pain%20Scale.pdf*).

This table offers a demonstration of potential for cross-national comparisons using data from the interRAI assessment system in nine OECD and non-OECD countries.

Source: New Zealand: National New Zealand interRAI Software Service (on behalf of New Zealand District Health Boards); Belgium: BelRAI-data, Federal Public Service Health, Food chain safety and Environment; Iceland: The Icelandic data is on all skilled NH´s in Iceland from a national data base on NH care, as per MDS 2.0. The supervisor of the data base is the Director General for Health in Iceland and the data base is maintained by Stiki ehf, data warehouse company; Italy: Italy are obtained from the Umbria region; Michigan, United States: Nursing home: from Michigan MDS 2.0 – the federally mandated assessment instrument for nursing homes – for 10/1/09 – 9/30/10); Home care: Michigan Home- and Community-Based Waiver interRAI HC data – the State-run community-based home care program (MI CHOICE) for persons in need of care at the nursing home level (Calendar year 2010); Hong Kong, China: RAI-HK HC data, SWD Elderly Services, HK SAR Government.

Table 3.A1.4. **Casemix/Distribution of populations in nursing home (NH) and home (community) care (HC) populations by the clinical groups of the Resource Utilisation Groups (RUGs) resource use casemix system**

RUG-III hierarchical groups[1]	Ontario, Canada NH	Ontario, Canada HC	Michigan, United States NH	Michigan, United States HC	Iceland NH	Iceland HC	Finland NH	Finland HC	United Kingdom NH	United Kingdom HC	Belgium NH	Belgium HC	Italy NH	Italy HC	Hong Kong, China NH	Hong Kong, China HC	New Zealand NH	New Zealand HC
	(N=90 115)	(N=152 558)	(N=83 893)	(N=14 621)	(N=2 307)	(N=)	(N=5 699)	(N=13 041)	(N=481)	(N=250)	(N=765)		(N=3 661)	(N=2 417)	(N=3 016)	(N=103 001)	(N=)	(N=11 163)
	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%
Rehabilitation	15.0	3.7	65.0	9.6	19.2	–	2.6	1.8	1.6	1.0	43.5	–	0.0	1.1	17.0	4.7	–	6.7
Extensive services	1.6	0.7	4.0	2.2	3.2	–	1.1	0.3	0.0	0.7	1.0	–	10.8	11.4	0.1	0.0	–	0.4
Special care	9.0	1.6	3.5	5.3	9.8	–	8.0	4.4	10.3	1.0	5.5	–	21.1	8.9	1.8	0.7	–	1.0
Clinically complex	16.5	22.0	9.4	44.5	19.5	–	16.9	1.4	20.7	31.1	11.5	–	20.1	32.5	21.7	40.1	–	18.8
Impaired cognition	10.8	7.3	4.4	8.3	13.5	–	16.3	20.4	6.6	4.8	13.5	–	9.6	2.8	8.5	1.1	–	19.4
Behaviour problems	2.8	1.2	0.1	0.9	1.6	–	2.8	6.3	2.7	1.7	2.0	–	2.0	0.4	0.4	6.7	–	0.7
Physical function reduced	44.3	63.5	13.6	28.9	33.1	–	52.2	55.4	57.8	59.5	23.0	–	36.3	42.9	50.5	46.6	–	53.2

1. Group: Outline of the clinical criteria for each group.

Rehabilitation group: Those receiving rehabilitation services

Extensive services: Physically dependent and requiring high intensity services parenteral feeding, suctioning, tracheostomy, ventilator/respirator.

Special care: Physically dependent and with clinical conditions associated with high nursing care input.

Clinically complex: Presence of clinical conditions that are associated with medical conditions.

Impaired cognition: Intermediate physical impairment and significant cognitive impairment.

Behaviour problems: Intermediate physical impairment and disruptive behavioural symptoms.

Physical function reduced: Those who do not match any of the above criteria.

For full explanation of the RUGs Casemix system see:

Fries, B.E., D.P. Schneider, W.J. Foley, M. Gavazzi, R. Burke and E. Cornelius (1994), "Refining a Case-mix Measure for Nursing Homes: Resource Utilisation Groups RUG-III", *Medical Care*, Vol. 32, pp. 668-685.

Carpenter, G.I., A. Main and G. Turner (1995), "Case Mix for the Elderly In-patient. Resource Utilisation Groups (RUGs) Validation Project", *Age and Ageing*, Vol. 24, pp. 513.

Carpenter, G.I., N. Ikegami, G. Ljunngren, E. Carrillo and B.E. Fries (1997), "RUG-III and Resource Allocation: Comparing the Relationship of Direct Care Time with Patient Characteristics in Five Countries", *Age and Ageing*, Vol. 26-S2, pp. 61-65.

Bjorkgren, M.A., B.E. Fries, A. Arbor and L.R. Shugarman (2000), "A RUG-III Casemix System for Home Care", *Canadian Journal on Aging*, Vol. 19, Suppl. No. 2, pp. 106-125.

This table offers a demonstration of potential for cross-national comparisons using data from the interRAI assessment system in nine OECD and non-OECD countries.

Source: New Zealand: National New Zealand interRAI Software Service (on behalf of New Zealand District Health Boards); Belgium: BelRAI-data, Federal Public Service Health, Food chain safety and Environment; Iceland: The Icelandic data is on all skilled NH's in Iceland from a national data base on NH care, as per MDS 2.0. The supervisor of the data base is the Director General for Health in Iceland and the data base is maintained by Stiki ehf, data warehouse company; Italy: Italy are obtained from the Umbria region; Michigan, United States: Nursing home: from Michigan MDS 2.0 – the federally mandated assessment instrument for nursing homes – for 10/1/09 – 9/30/10; Home care: Michigan Home- and Community-Based Waiver interRAI HC data – the State-run community-based home care program (MI CHOICE) for persons in need of care at the nursing home level (Calendar year 2010); Hong Kong, China: RAI-HK HC data, SWD Elderly Services, HK SAR Government.

Table 3.A1.5. **Casemix/Prevalence of clinical and social indicators by physical and cognitively impaired sub-groups in nursing home (NH) and home (community) care (HC) populations**

Sub-groups[1]	Characteristic	Ontario, Canada		Michigan, United States		Finland		United Kingdom		Belgium		Italy		Hong Kong, China		New Zealand	
		NH	**HC**	**NH**	**HC**	**NH**	**HC**	**NH**	**HC**	**NH**	**HC**	**NH**	**HC**	**NH**	**HC**	**NH**	**HC**
		(N=90 115)	(N=152 558)	(N=83 893)	(N=14 621)	(N=5 699)	(N=13 041)	(N=481)	(N=250)	(N=765)	(N=4 070)	(N=3 661)	(N=2 417)	(N=3 016)	(N=103 001)	(N=)	(N=11 163)
		%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%
Good physical condition/Good cognition (ADLH 0-1/CPS 0-1)	**% (N) in this sub-population**	8.3 (6,210)	50.2 (76,636)	3.6 (2,985)	32.2 (4714)	3.5 (202)	49.2 (6416)	7.3 (35)	58.1 (168)	8.9 (68)	24.0 (975)	5.8 (213)	11.3 (272)	36.3 (1096)	38.7 (39881)	–	46.9 (5222)
	Uncontrolled pain	20.7	17.5	34.3	11.5		19.5	0	19	10.8	11.8	1.9	5.1	12.2	9.6	–	16.5
	Falls (any in past 90 days)	16.5	26.6	11.6	21	5.5	21.3	14.3	31	11.3	30.3	9.4	8.4	9.3	29.1	–	27.7
	Any use of trunk restraint/ chair prevents rising	0	n.a.	0	n.a.	0	n.a.	0	n.a.	0.1	n.a.	2.8	n.a.	0.2	n.a.	–	n.a.
	Bladder incontinence daily or more freq.	9.4	10.2	1.7	28.6	13.9	12.9	17.1	15.5	25.9	21.38	7	9.5	1.1	1	–	17.6
	Pressure ulcers (any > grade 1)	1.1	1.7	2.7	2	1.5	2	0	2.4	4.7	2.2	0.5	4	0.3	0.4	–	0.9
	No flu shot in past year	n.a.	27.1	n.a.	22.1	n.a.	34.1	25.7	19	7.8	23.6	17.8	16.4	–	44.2	–	23.6
	Lonely	n.a.	13.7	n.a.	18.7	n.a.	24.2	8.6	36.3	26.5	37.1	15	15	–	28.8	–	19.4
	Depression (DRS > 2)	15.7	12.4	5.3	9.3	21.3	11.9	17.1	20.2	20.2	24.9	26.8	19.3	2.1	8.1	–	n/a
Poor physical condition/Good cognition (ADLH 2+/CPS 0-1)	**% (N) in this sub-population**	17.9 (13,418)	10.9 (16,608)	40.7 (34,177)	21.7 (3171)	10.1 (574)	5.6% (726)	27.7 (133)	14.5 (42)	21.2 (162)	34.8 (1417)	19.6 (717)	28.8 (696)	14.0 (421)	9.2 (9460)	–	8.2 (916)
	Uncontrolled pain	25.5	21.5	39	13	25.3	27.1	4.5	33.3	14.5	9.6	3.5	8.8	18.5	10.7	–	17
	Falls (any in past 90 days)	21.4	35.2	11.9	24.4	8	26.9	5.3	23.8	32.1	36.6	29.1	16.8	11.9	37.1	–	33.2
	Any use of trunk restraint/ chair prevents rising	5	n.a.	0.2	n.a.	9.2	n.a.	0	n.a.	8.2	n.a.	5.3	n.a.	19.2	n.a.	–	n.a.
	Bladder Incontinence daily or more freq.	52	22	15.1	43.7	62.7	37.3	64.7	11.9	41.18	30.52	41	31.2	39.9	0.9	–	32.4
	Pressure ulcers (any > grade 1)	6.8	5.2	11.1	9	4.7	5.9	6	7.1	7.1	2.9	9.5	16.7	2.9	6.1	–	4
	No flu shot in past year	n.a.	31.7	n.a.	30.6	n.a.	36.8	29.3	33.3	10.3	17.8	12.4	14.2	–	45.6	–	32.2
	Lonely	n.a.	11.1	n.a.	17.8	n.a.	19.2	21.8	28.6	35.1	29.6	11.2	10.8	–	27.5	–	15
	Depression (DRS > 2)	28.3	18.3	5.8	12.7	29.6	19	30.8	23.8	27.5	22.8	32.6	30	3.6	7.3	–	n/a

Table 3.A1.5. **Casemix/Prevalence of clinical and social indicators by physical and cognitively impaired sub-groups in nursing home (NH) and home (community) care (HC) populations** (cont.)

Sub-groups[1]	Characteristic	Ontario, Canada NH	Ontario, Canada HC	Michigan, United States NH	Michigan, United States HC	Finland NH	Finland HC	United Kingdom NH	United Kingdom HC	Belgium NH	Belgium HC	Italy NH	Italy HC	Hong Kong, China NH	Hong Kong, China HC	New Zealand NH	New Zealand HC
		(N=90 115)	(N=152 558)	(N=83 893)	(N=14 621)	(N=5 699)	(N=13 041)	(N=481)	(N=250)	(N=765)	(N=4 070)	(N=3 661)	(N=2 417)	(N=3 016)	(N=103 001)	(N=)	(N=11 163)
		%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%
Good physical condition/Poor cognition (ADLH 0-1/CPS 2+)	% (N) in this sub-population	5.7 (4,295)	23.0 (35,061)	2.9 (2,442)	19.4 (2840)	5.7 (322)	35.2 (4586)	2.1 (10)	12.8 (37)	5.1 (39)	11.1 (453)	3.5 (127)	2,3 (55)	10.9 (329)	30.4 (31313)	–	30.4 (3385)
	Uncontrolled pain	13.5	11.9	8.4	9.6	11.8	15.1	0	24.3	2.2	5.7	0.8	1.8	8.5	5.5	–	9
	Falls (any in past 90 days)	19.5	33.4	20.7	26.3	6.8	25.8	20	27	23.8	34.7	12.6	14.5	13.1	31	–	28.9
	Any use of trunk restraint/ chair prevents rising	0.1	n.a.	0	n.a.	0	n.a.	0	n.a.	0	n.a.	1.6	n.a.	3.7	n.a.	–	n.a.
	Bladder incontinence daily or more freq.	11.1	15.3	4.9	38	12.7	16.7	30	5.4	23.9	26.1	13.4	27.3	5.5	2	–	19.9
	Pressure ulcers (any > grade 1)	0.8	0.7	0.9	1.3	1.2	1.3	0	0	0	2.5	0.8	5.5	0	0.4	–	0.8
	No flu shot in past year	n.a.	24.3	n.a.	24.2	n.a.	34.1	20	27	8.1	25.9	12.6	27.3	–	38.9	–	29.9
	Lonely	n.a.	16.4	n.a.	22	n.a.	32	10	35.1	25	32.2	10.2	27.3	–	24.9	–	19.9
	Depression (DRS > 2)	27.8	19.8	12	20.4	32	19.1	0	29.7	39.1	42.4	29.9	38.2	4.6	8.6	–	n/a
Poor physical condition/Poor cognition (ADLH 2+/CPS 2+)	% (N) in this sub-population	68.0 (50,926)	15.9 (24,253)	52.8 (44,289)	26.7 (3896)	80.7 (4,601)	10.1 (1,313)	62.8 (302)	14.5 (42)	64.8 (496)	30.1 (1,225)	71.1 (2,604)	57.6 (1,392)	38.8 (1170)	21.7 (22,347)	–	14.7 (1640)
	Uncontrolled pain	15.7	12	14.1	7.5	19	19.9	2.6	14.3	10.7	8.2	1.7	5	7.4	5.2	–	12
	Falls (any in past 90 days)	28.4	39.7	21.1	28.9	6.6	34.4	6.3	45.2	28.7	41.8	19.9	14.5	9.3	30.8	–	37.7
	Any use of trunk restraint/ chair prevents rising	23.1	n.a.	2.7	n.a.	18.7	n.a.	1	n.a.	19.9	n.a.	23.1	n.a.	54.2	n.a.	–	n.a.
	Bladder incontinence (daily or more freq.)	77.2	46.5	50.9	66.5	85.6	55.5	85	57.1	66.2	47.4	67.8	60.5	76.3	41.8	–	55.7
	Pressure ulcers (any > grade 1)	6.4	3.2	10.5	7.9	4	3.7	8.9	21.4	8.1	1.2	20.5	27.1	4.3	8.5	–	3.7

Table 3.A1.5. **Casemix/Prevalence of clinical and social indicators by physical and cognitively impaired sub-groups in nursing home (NH) and home (community) care (HC) populations** (*cont.*)

Sub-groups[1]	Characteristic	Ontario, Canada NH	Ontario, Canada HC	Michigan, United States NH	Michigan, United States HC	Finland NH	Finland HC	United Kingdom NH	United Kingdom HC	Belgium NH	Belgium HC	Italy NH	Italy HC	Hong Kong, China NH	Hong Kong, China HC	New Zealand NH	New Zealand HC
		(N=90 115)	(N=152 558)	(N=83 893)	(N=14 621)	(N=5 699)	(N=13 041)	(N=481)	(N=250)	(N=765)	(N=4 070)	(N=3 661)	(N=2 417)	(N=3 016)	(N=103 001)	(N=)	(N=11 163)
		%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%
	No flu shot in past year	n.a.	27	n.a.	26.4	–	29.2	20.9	26.2	7.6	21.2	12.6	11.8	–	50.1	–	33.3
	Lonely	n.a.	9.4	n.a.	15.3	–	27	15	14.3	29.8	28.6	9.3	10.1	–	17.3	–	11.2
	Depression (DRS >2)	34.5	22	11.3	21.2	31.4	25.9	35	26.2	44	36.7	35.1	31.5	3.9	5.2	–	n/a

1. Sub-groups are created by dividing the population into physical function groups – good (ADL Hierarchy score of 0-1) or poor (ADL Hierarchy score ≥ 2), and cognitive function groups – good (interRAI Cognitive Performance Score 0-1) or poor (interRAI Cognitive Performance Score ≥ 2), and combining them to give four distinct sub-groups. The ADL hierarchy groups activities of daily living according to the stage of the disablement process in which they occur. The ADL hierarchy ranges from 0 (no impairment) to 6 (total dependence) (*www.interai.org/asets/files/scales/ADLhierarchy.pdf*).

Cognitive performance scale: Combines information on memory impairment, level of consciousness, and executive function, with scores ranging from 0 (intact) to 6 (very severe impairment). Scores of 3 or greater indicate likely presence of dementia (*www.interrai.org/assets/files/Scales/Cognitive Performance Scale.pdf*).

This table offers a demonstration of potential for cross-national comparisons using data from the interRAI assessment system in nine OECD and non-OECD countries.

Source: New Zealand: National New Zealand interRAI Software Service (on behalf of New Zealand District Health Boards); Belgium: BelRAI-data, Federal Public Service Health, Food chain safety and Environment; Iceland: The Icelandic data is on all skilled NH´s in Iceland from a national data base on NH care, as per MDS 2.0. The supervisor of the data base is the Director General for Health in Iceland and the data base is maintained by Stiki ehf, data warehouse company; Italy: Italy are obtained from the Umbria region; Michigan, United States: Nursing home: from Michigan MDS 2.0 – the federally mandated assessment instrument for nursing homes – for 10/1/09 – 9/30/10); Home care: Michigan Home- and Community-Based Waiver interRAI HC data – the State-run community-based home care program (MI CHOICE) for persons in need of care at the nursing home level (Calendar year 2010); Hong Kong, China: RAI-HK HC data, SWD Elderly Services, HK SAR Government.