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The Use of Data Analytics to Build an Australian Context-Sensitive Health Informatics Framework for Consumer-Directed Community Aged Care

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Abstract. The challenge of providing services that meet the growing needs of an ageing population is one confronted by communities across Australia and internationally. The aim of this study was to: a) undertake semi-structured interviews and focus groups across a sample of service and technical staff to identify the interconnection between communication, information, work practices and performance; and b) carry out a comprehensive review of existing data sources to identify the data linkages required to identify and monitor performance across different dimensions of the quality of aged care spectrum. The results from this study provided empirical evidence of the interconnection between communication, information, work practices and performance; and highlighted numerous potential data linkages which can be used to monitor performance across different dimensions of aged care. These included: the uptake and utilisation of community care services, community aged care client interactions and transitions (with hospitals and other health care providers), and quality of life measures (e.g., health and safety status, symptoms of depression and anxiety, social integration and mortality rates).

Keywords. Data analytics, evaluation, health data science, organisational communications, socio-technical

Introduction

The challenge of providing services that meet the growing needs of an ageing population is one confronted by communities across Australia and internationally. According to an Australian Institute of Health and Welfare (AIHW) report, the period between June 2002 and June 2011 saw an increase of over 25% (2.5 million to 3.1 million) in the number of people aged 65 and over. This demographic now accounts for 13.8% of the Australian population [1] and is projected to rise to 20% by 2024 [2]. Providing efficient, effective and comprehensive services for older people is one of the biggest policy concerns facing governments globally [3-7]. It has prompted a major re-evaluation of current aged care policies and led to a greater emphasis on home and community-based care [8].

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Although the issues related to an ageing population confront all sectors of the economy, its impact is felt most sharply by community, social and health services [9]. Community aged care services aim to support older people to live independently in their homes, and to maintain and/or enhance their quality of life. The Australian Productivity Commission has identified that the aged care sector in Australia is overstretched, difficult to navigate and suffers from service gaps with wide variations in quality [6, 10]. For older people and their carers, this translates into everyday problems navigating the system [3]. These difficulties have detrimental effects on safety, outcomes, consumer satisfaction and the overall efficiency of the system [5]. According to the Australian National Aged Care Alliance, the core of the problem is related to the lack of accessibility and timeliness of information, services, and support [11].

Consumer-directed care (CDC) policy was required for all home care packages in Australia from 1 July 2015. This policy shifted responsibility for determining service needs to clients (and/or carers). CDC initiatives (in this country and across the OECD) are widely seen to be a means of enhancing consumer control, and increasing efficiency and effectiveness. However, community aged care providers across Australia are reported to be facing major difficulties meeting the significant logistic requirements associated with the introduction of CDC [12]. In most cases these problems are related to the lack of adequate information and communication technologies (ICT) and the organisational communication and informational infrastructure needed to deal with this major shift in service provision and delivery [10, 13, 14]. The aim of this study was to: a) undertake semi-structured interviews and focus groups across a sample of service and technical staff to identify the interconnection between communication, information, work practices and performance; and b) carry out a comprehensive review of existing data sources to identify the data linkages required to identify and monitor performance across different dimensions of the quality of aged care spectrum.

1. Design and setting

The setting for this research was an aged care provider responsible for delivering community aged care services across New South Wales and the Australian Capital Territory. The provider supports some 7,500 clients with 1,200 staff providing home care packages, services and support [15]. The provider has pioneered the development of a new service operating model for its community care services to establish consumer-directed services. This includes the introduction of an integrated service centre incorporating a client management system (Carelink+) [16] and sophisticated mobile ICT solutions to support frontline support workers [15]. The implementation of this service model involved major organisational re-design and change management practices including: a) centralised access to service information for clients; b) an integrated information system with which to monitor client needs, service utilisation and its coordination; and c) resource coordination to assist the management and deployment of staff and services.

1.1. Qualitative methods to investigate the perceptions of community aged care staff to CDC and ICT

Qualitative semi-structured interviews and focus groups were used to identify the interconnection between communication, information, work practices and performance. The questions pursued issues related to a number of domains including: a) *technical* (e.g., compatibility of the new systems with each other?); b) *professional* (e.g., does it make work easier?); c) *organisational* (e.g., is the organisation prepared?).

A theoretical sampling approach was employed whereby participants were selected according to their relevance to the study question [17]. We targeted the following individuals: (a) Customer Service Officers (n=4) who operate the service centre and use Carelink+ as the primary information and communication technology system; (b) the Service Manager (n=1) at the centralised service centre, responsible for the training, development, and support of Customer Service Officers using Carelink+; (c) the Information Architect (n=1) who worked to build a holistic view of the provider's work processes, information, and ICT assets; (d) the Implementation Analysts (n=2), who ensured that deployments of new information and communication technologies were carried out correctly, and that the existing information and communication technology infrastructure was maintained; and, (e) the Program Manager for Continuous Service Improvement (n=1), who was responsible for successful delivery of the new integrated care model. Sampling ended once saturation had been reached and it was clear that no new themes were emerging, and the research findings were coherent and explicable. Data analysis involved an initial open coding of all interviews and focus group transcriptions using NVivo software [18]. This was followed by axial coding using grounded theory techniques [17] whereby initial codes, indicators and concepts were triangulated with other findings (e.g., observational, and quantitative) leading to refined analytical levels, relevant to the aims of the study [19].

1.2. Data linkage and analytics

The study involved a comprehensive review of existing data sources to identify the data linkages required to identify and monitor performance across different dimensions of the quality of aged care spectrum including: a) the coordination and continuum of care (e.g., client access to, and transition between their home, aged care facility and hospital); b) quality of life measures (e.g., health and safety status, symptoms of depression and anxiety, increased social integration and decreased mortality rates); and c) home tenure, maintenance and comfort (e.g., availability of secure residence, managed housework, food and nutrition).

2. Results

Participants in the study defined the work that they were involved with throughout their day. Customer Service Officers described how their tasks and activities involved the management of community aged care clients (consumers). This included the assessment of client needs, client preferences and service needs. The Service Manager explained the role they played in the management of the workforce including the monitoring of care workers, rosters (e.g., administrative tasks, incidence reports, responding to correspondence); and services (service types and service tasks). Each of

these broad areas (depicted in Figure 1 below) were associated with a unique set of data domains (Referral, Needs, Services, Leave, Cessation and Carer). The Information Architect and Implementation Analysts explained these were the key factors that underpinned communication and information exchange across the service.



Figure 1. Carelink+ key data domains

A snapshot of the interconnections between different data sources is depicted in Figure 2 (below). Data sources included: Leave data (i.e., when a consumer is away from their home), Pension data (i.e., relevant to a consumer's financial status), Service data (i.e., services received) and information about clients in the National Respite for Carers Program and Australian Community Care Needs Assessment data. Figure 2 illustrates how the provision of community aged care services is an information-intensive activity reliant upon vast amounts of data from a large array of services, ranging from healthcare providers and welfare institutions, to social and community providers. Participants reported that there is currently no agreed-upon and reliable dataset which can be used by service providers or funders to measure and benchmark (and improve) the effectiveness of community aged care services within Australia.



Abbreviations: ACCNA - Australian Community Care Needs Assessment; NRCP - National Respite for Carers Program

Figure 2. Examples of existing data sources within Carelink+

3. Discussion

Prior research about the quality of aged care services has demonstrated a number of deficiencies in the community aged care sector common across many countries [20]. These include: i) the lack of robust evidence about community care and consumer choice options with which to inform and guide policy and decision making [21]; ii) the failure to utilise information and communications technology to promote quality monitoring and enhance service integration and consumer choice [21]; and iii) an overemphasis on measuring structural inputs (e.g., resource utilisation) to the detriment of measures of consumer outcome, satisfaction and quality of life [20]. Historically, aged care services have struggled with the issue of information fragmentation, where data are stored in isolated systems or silos such as the general practice, the hospital or with allied health, which can make it difficult to ensure proper coordination and continuity of care [14].

The results from this study provide: a) empirical evidence of the interconnection between communication, information, work practices and performance; and b) identify key and potential data linkages required to monitor performance across different dimensions of the aged care spectrum. This in turn, establishes a foundation for measuring and continuously monitoring key performance and quality metrics including:

• The uptake and utilisation of community care services compared across different locations (e.g., metropolitan, rural and remote); and across different

demographic client groupings (e.g., socio-economic groups, gender, culturally and linguistically diverse groups).

- Community aged care client interactions and transitions (with hospitals and other health care providers);
- Quality of life measures (e.g., health and safety status, symptoms of depression and anxiety, social integration and mortality rates).

There are a number of potential benefits from the generation of evidence from comprehensive and rigorous data linkage. For care providers it can mean an increase in the capacity to plan and monitor the delivery of effective services. For service planners and the wider community, the project will enhance the social benefits and capital accrued by older peoples' ability to continue to engage with their community.

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