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Characterizing “information transfer” by using a Joint Cognitive Systems model to improve continuity of care in the aged

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ABSTRACT

Purpose: This study explores multidisciplinary and cross-sector health professional experiences with the information needs for safe patient transfers across the care continuum using a Joint Cognitive Systems (JCS) model. Qualitative experiences of three JCS components and their attributes and are presented.

Methods: A qualitative content analysis using Joint Cognitive Systems constructs were extracted from sixteen multidisciplinary and cross-sector health professional interviews. Participants were asked to describe their information needs and experiences with the patient transfer process.

Results: Information transfer associated with three JCS constructs (alignment of goals, enhanced control, and co-agency dynamics) was examined. The breakdown in the information transfer process might be due to the relative strengths of each sector's core expertise. Alignment must cross settings and disciplines and consist of the: (1) transfer of goal relevant and integrated information; (2) accommodation to the control attributes of increased clinical complexity, lack of systematic work processes and feedback or feed forward information; and (3) improvement in the co-agency dynamics of interdependency, trust, inter-related actions and expertise.

Conclusions: Economic pressures and care complexities of the aged require improved effectiveness and efficiencies in the information transfer process. This study aims to understand the information transfer needs from hospitals to skilled nursing care laying a foundation towards a medical informatics solution. An informatics solution must accommodate the differing contextual environments and subsequent information needs and paradigms of the Joint Cognitive System of care across the continuum.

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1. Introduction

This paper reports on a theoretically based, qualitative investigation into the information exchange process surrounding care transitions. In less than 20 years, seniors (65 and older) will comprise 20% of the U.S. population [1] placing considerable pressure and increasing expectations on the

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healthcare and social services delivery system. Governmental programs such as Medicare and Medicaid paid over 33% of the national healthcare bill in 2002 and public support for healthcare is projected to comprise more than half of all U.S. healthcare spending by 2012 [2]. Health expenditures reached \$2.3 trillion in 2008 representing 16% of the Gross National Product [3] with approximately 47% paid through public funding. Thirty-one percent of the expenditures was spent for hospital care, 5.9% on skilled nursing care, 21% on physician and clinical care, and 10% on prescription drugs [3]. Health expenditures increase with age and disability. Expectations on hospital services to lower their length of stays, to improve hospital discharge timing, and to provide more cost efficient care is increasing pressure on post-hospital services.

The Centers for Disease Control (CDC) predicts that by the year 2030, seniors will demand even more long-term care, resulting in a demand for over 2 million beds in skilled nursing care [4]. Governmental programs are the payer of first choice for those 65 and older. As age increases and health status decreases, healthcare expenditures increase. Additionally as the number of co-morbidities increases with age, so does the cost of care. Those individuals with five or more conditions incur nearly five times (\$25,132) the average costs compared with those without chronic conditions (\$5186). Skilled care versus community care also results in a \$5–\$1 ratio [1]. More frequent hospitalizations for shorter time periods (quicker and sicker) is the U.S. trend for aging adults [5] resulting in cost shifting [6]. Rates of hospitalization for those 65 and older have increased from 306 per 1000 Medicare enrollees in 1992 to 336 in 2007, while hospital inpatient lengths of stay decreased from 8.4 in 1992 to 5.6 days in 2007. Improving care across the continuum can control costs [7].

Long-term care expenditures, in particular, are increasing and have nearly doubled from \$69.6 billion in 2000 to \$116.7 billion U.S. dollars in 2009 with an increase in the frequency of care transitions between sectors across a senior's lifespan [8]. Because transfers and “hand-offs” are particularly prone to inefficiencies, errors, and adverse events, information flow must not only be improved across settings [9], it must be done in a manner that adds true patient care value. Older adults are discharged from hospital care “quicker and sicker” compounding the healthcare transition problem. The combined economic pressures and care complexities will significantly increase the need for improved effectiveness and efficiencies as older adults traverse the complicated healthcare geography.

Improving transitions in care is a high priority [10] and occurs frequently in the senior population (at least once in 40% of patients and as frequently as five or more times in 6.3% of a patient population) [11,12]. Murtaugh and Litke found that close to 18% of the elders in their cohort had one or more transitions in a two-year period. Women were more likely than men to have at least one transition and the probability of transition increased with age [13]. Approximately one third of the transitions were from hospitals to a post-acute care or long-term care setting. Many of the hospitalizations were avoidable, with five conditions (heart failure, pneumonia, kidney or urinary tract infection, volume depletion including dehydration, and angina) accounting for 75% of potential avoidable hospitalizations. In one British study, older adults averaged 35 hospital days in the last 2 years of their lives with an

average of 4.2 admissions in the three years prior to death [14]. Multiple solutions to improve transitions in care have been proposed and selectively tested. Such solutions include care coordination (13 of 15 randomized trials showed no significant differences in subsequent hospitalizations and net savings) [15], the development of discharge checklists for hospitalists based on expert opinion [16], improved nurse to nurse communication using patient transition information checklists [17], and a movement towards information transfer interoperability [18–20]. There remains however, a lack of standardization of the necessary information data elements and processes as effective strategies to improve patient outcomes.

The current movement to electronic health records and the electronic transfer of information puts new pressures on communication structures and traditional methods of information exchange. As in any socio-technical system, the development of new technology can be disruptive and chaotic [21]. These three significant pressures: (1) changing demographics, (2) increasing numbers of transfers and multiple care environments, and (3) increasing pressure to move towards an electronic record will create new challenges in information exchange across healthcare sectors on behalf of continuity of care.

1.1. Contextual dissonance across sectors

Acute care, long-term care, and community care are vital components of the continuum of care [22] and finding common ground across these sectors is challenging as hospital discharge planners know firsthand. When coordinating care across the continuum, each sector functions in differing contextual environments. These clinical contexts vary in sector goals (acute, skilled, and community care); healthcare regulatory structures (government vs. private, federal vs. local); reimbursement methodologies (private pay, private insurance, long-term care insurance, Medicare, Medicaid); and information needs and systems (biomedical, legal, financial, quality of life, end of life, or restorative). Each of these varying contextual factors compounds the complexity of care transfer. Bridging this variation on behalf of the patient requires: (1) recognition and understanding of the dissonance between the sectors; (2) a clear understanding of the inter-professional information needs to develop a system-wide sustainable solution; and (3) an understanding of what constitutes common ground.

1.2. Joint Cognitive System

Joint Cognitive Systems (JCS) [23] is the study of “how humans cope with and master the complexity of processes and technological environments”. JCS employs a “systems” view that emphasizes the interdependence of human cognition and the environmental context in which work occurs. Rather than viewing work as the interaction of disparate individuals exchanging information or acting upon an environment, work can be seen as a “Joint Cognitive System.” When the Joint Cognitive System is modeled and understood, joint functions can be improved to achieve a desired outcome.

Three concepts key to the JCS perspective include *goal-orientation*, *control*, and *co-agency*. The first underlying assumption to the model is that all work systems (indeed,

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