The Connected Learning Model for disseminating evidence-based care practices in clinical settings

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SUMMARY

Clinical practice guidelines have been developed to improve patient care and outcomes. Guideline implementation is often stymied by the complexity of patients' conditions, complex care environments, and limited advanced clinical training of nursing staff. To translate key elements of heart failure guidelines into practice in a nursing home, the Connected Learning Model was developed based on the diffusion of innovations framework. An advanced practice nurse in geriatrics fostered greater interaction and collaboration among key administrative, medical, and nursing staff to promote awareness of heart failure guidelines and to translate key practices from those guidelines into the nursing home setting. Direct care staff skills for early recognition and reporting of signs and symptoms of acute heart failure were enhanced through a learner-centered educational program which included classroom and unit-based instruction and bedside clinical teaching. The Connected Learning Model is a promising method to mobilize advanced nursing expertise to bridge research/practice gaps through implementation of clinical practice guidelines that are systematically adapted to accommodate diverse health care contexts.

INTRODUCTION

Aging of the population globally, increased chronic illness and health care needs in the aged, and altered family support has resulted in increased demand for long term care services, including nursing home care (Chu and Chi 2008; Karlsson et al., 2009; Kim et al., 2006; Wu et al., 2009). However, concerns about the quality of care in nursing homes arise because nursing homes tend to operate outside the academic mainstream and often lack access to information about scientific developments that could improve care.

Clinical practice guidelines aim to improve care through dissemination of synthesized literature and recommendations for best practices, and hold considerable promise for encouraging implementation of evidence-based approaches to care of older adults in nursing homes. Although clinical practice guidelines can aid clinical decision-making, they are not “self-implementing” (Berta et al., 2005) and do not offer adequate “how to” information for translation into practice settings and in populations such as frail elders (Leeman et al., 2006). Successful nursing models for implementation of evidence-based practice in diverse care settings are lacking. Nursing homes pose particular challenges to guideline implementation because of the clinical complexity of patients amidst low levels of registered nurse (RN) staffing (Colon-Emeric et al., 2007; Harrington, 2005; Malmedal et al., 2009). Additionally, many nursing home staff is educated at the technical level (Schofield et al., 2005) and have not been prepared to use clinical practice guidelines in practice (Ryden et al., 2000). Nursing models are needed to implement clinical practice guidelines under the current constraints of nursing home settings (Baldwin et al., 2003; Buchan and Dal Poz, 2002; Coffey 2004; Eriksen, 2006; Hayes and Martin, 2004; McConnell et al., 2007).

This paper describes the development, implementation, and feasibility evaluation of the Connected Learning Model to facilitate adoption of heart failure (HF) clinical practice guidelines for symptom recognition in one nursing home. The prevalence of HF is growing globally and contributes to significant morbidity, mortality and poor quality of life among older adults (Bleumink et al., 2004; Cubillos-Garzon et al., 2004; Mendez and Cowie, 2001; Okura et al., 2008). HF guidelines recommend early recognition and treatment of symptoms to prevent emergency hospitalization, morbidity, and mortality (American Medical Directors Association, 2002; Heart Failure Society of America, 2006; Hunt et al., 2001). Adequate knowledge about symptom recognition and reporting among nursing home staff could improve care and outcomes in HF patients.

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The Connected Learning Model

The Connected Learning Model was developed to enhance the capacity of direct care nursing home staff to implement a new care practice for HF symptom recognition. The model is based on the diffusion of innovations framework, which describes how innovations are adopted into use (Rogers, 2003). Two concepts in the diffusion framework are especially relevant to implementation of practice guidelines: linkage and learning capacity (Greenhalgh et al., 2004). Linkage refers to how an innovation spreads throughout an organization via interpersonal communication. Linkage addresses what an innovation is and what it does, and how it can be made to work within an organization (Greenhalgh et al., 2004; McConnell et al., 2007). Learning capacity is the ability to recognize, assimilate, and apply new information to improve decision-making and outcomes (Berta et al., 2005; Cohen and Levintal, 1990; Zahra and George, 2002). Learning capacity depends on prior knowledge which facilitates the acquisition and application of more complex information. Learning capacity is achieved through formal and informal education and communication. Organizational learning capacity helps clinical settings keep pace with scientific advancements.

A master's prepared advanced practice nurse with geriatric specialization was chosen to implement the Connected Learning Model. Master's prepared nurses possess a broad range of clinical and leadership competencies that are essential to building teams and promoting care quality in nursing homes (American Association of Colleges of Nursing, 1995; Mezey et al., 2005; Ryden et al., 2000). Advanced practice nurses have expertise in chronic disease management and clinical care and are well suited to foster the linkage function described by Rogers to increase the learning capacity of organizations (Brown, 1998; Titter, 2004). Geriatric specialization adds depth knowledge and skills related to health promotion and illness care of older adults across diverse care settings.

Implementation of the Connected Learning Model

Setting

The Connected Learning Model was implemented in a 114-bed nursing home located in the southeastern US. The facility was certified to receive payment from private insurance companies and federally-sponsored programs. Medical care was provided by geriatrician faculty from an affiliated university, community-based physicians, and two nurse practitioners. Four nursing units were staffed with a licensed practical nurse (LPN) charge nurse, nursing assistants (NAs) who provided personal care, and an RN supervisor. The usual NA-to-resident ratio was 1:11 on the day shift. Nearly one-third (31%) of the patients had a diagnosis of HF.

Connecting leadership goals with practice guidelines

Because there is strong evidence that support from top-level management for new care practices facilitates adoption, the Geriatric Advanced Practice Nurse interacted initially with the nursing home’s leadership: the nursing home administrator, medical director, director of nursing, assistant director of nursing, staff development coordinator, and two RN supervisors. This group formed a practice improvement team who provided organizational support. The Geriatric Advanced Practice Nurse convened team meetings to determine the focus for clinical practice improvement. Team meetings determined that the nursing and medical staff agreed that communication about HF symptoms could be improved. Physicians thought that telephone communication was not timely and critical information needed to manage care was often lacking. Nursing staff were distressed by the frequent hospitalizations and the steady decline they witnessed in their patient’s function and well-being. Therefore, the focus of the clinical practice improvement project was on developing a program for the early recognition and reporting of signs and symptoms of acute HF in order to ensure timely treatment.

Table 1

Core curriculum for heart failure education.

- Overview of heart failure: structure, function, and pathophysiology
- Heart failure risk factors and causes
- Acute heart failure: recognizing and reporting symptoms
- Chronic heart failure: management and symptom monitoring
- Drug therapy: therapeutic effects, side effects, and monitoring
- Heart failure and physical activity
- Heart failure and nutrition
- End of life care: symptom management

Table 2

Educational session content, teaching methodology, and delivery format exemplars (all sessions taught, co-taught, or facilitated by the Geriatric Advanced Practice Nurse).

<table>
<thead>
<tr>
<th>Topic</th>
<th>Classroom session</th>
<th>Unit-based sessions</th>
<th>Bedside clinical teaching</th>
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<tbody>
<tr>
<td>Heart failure overview: normal and abnormal heart function</td>
<td>Presentations, group discussion, handouts, quizzes, questions/answer, simulation of how the heart works using a purchased table top heart model with fluid chambers that showed arterial and venous circulation. Contest naming the signs and symptoms of heart failure provided review and reinforcement of new learning.</td>
<td>Small group role play simulation with one NA assuming acute HF symptoms, and other NAs practicing the role of a patient with observing signs and asking about symptoms, and completing the HF worksheet. Co-taught with an NA.</td>
<td>Demonstration on how to observe and assess signs and symptoms of HF using the FACES card and worksheets.</td>
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<tr>
<td>Acute heart failure</td>
<td>A physician invited a patient to discuss their experience of an acute HF exacerbation, hospitalization, return to the nursing home and recovery. The physician highlighted key signs and symptoms and the patient described the symptom experience.</td>
<td>A poster was designed to illustrate degrees of shortness of breath: shortness of breath with or without exertion, orthopnea, paroxysmal nocturnal dyspnea, dyspnea at rest or during eating or speaking. Discussion of patients on the unit with different levels of respiratory symptoms and severity of HF. Coach LPNs in documenting HF assessments in the medical record and preparing a report for telephone communication with the nurse practitioner and physician.</td>
<td>Physician and advanced practice nurse reviewed and demonstrated heart and lung assessment for LPNs in a patient admitted from the hospital following acute HF. NAs were coached in symptom recognition and ways to adjust care to prevent worsening symptoms. Review weight increase and vital signs in a patient with new shortness of breath and edema. NAs practice using the FACES card and HF worksheet and compare findings to baseline.</td>
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<tr>
<td>Chronic heart failure</td>
<td>A case study was co-presented with an LPN comparing two patients in the nursing home who manifest fluid overload differently (lower extremity signs and symptoms of edema versus ascites and sacral edema).</td>
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<td>Evaluation of edema in a patient who needed but refused to wear elastic compression hose. Discuss importance of reducing edema and reducing heart workload.</td>
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<tr>
<td>Drug therapy</td>
<td>Physician presented an overview of HF medications and their treatment effects, adverse effects, and side effects. Focused on the nursing role in monitoring drug therapy outcomes.</td>
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The Geriatric Advanced Practice Nurse collected and appraised information from HF clinical practice guidelines, scientific articles, and local experts to establish the evidence base for HF symptom recognition in the nursing home. From this evidence synthesis, a curriculum plan and related educational materials were developed. A comprehensive education program was designed for RN, LPN, and NA nursing staff. The HF core curriculum (Table 1) was developed to guide educational sessions and application of knowledge into practice. The design of the teaching sessions was based on adult learning principles and experiential learning (Kolb, 1984) to ensure relevance, engagement and transfer into clinical practice. In partnership with the medical staff, interdisciplinary team (physical therapist, dietician, and social worker) and direct care nursing staff, the Geriatric Advanced Practice Nurse co-facilitated peer and collaborative teaching sessions in the classroom and on the clinical unit, bedside clinical teaching sessions and small group classroom sessions to promote active learning. The curriculum was delivered in short sessions (10–30 min) using experiential techniques such as case studies, role-playing, and simulation exercises. 

### FACES: Heart Failure Signs & Symptoms

<table>
<thead>
<tr>
<th>Look For</th>
<th>How to Help the Patient</th>
<th>Notify the Nurse if</th>
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<tbody>
<tr>
<td><strong>F</strong> Fatigue</td>
<td>If patient tires more easily, use rest periods during ADLs to prevent fatigue. Encourage walking and other physical activities, as tolerated. Take vital signs, report if abnormal.</td>
<td><strong>You notice the patient:</strong></td>
</tr>
<tr>
<td>Fast pulse</td>
<td></td>
<td>Is more tired than usual.</td>
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<tr>
<td><strong>A</strong> Activities of daily living</td>
<td>Is confused, anxious, nervous, fearful, or agitated.</td>
<td></td>
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<tr>
<td>Appetite poor</td>
<td>Assist with care and pace activities to minimize fatigue and shortness of breath. Break tasks into small steps. Offer small amounts of food, more often. Offer a soft diet if patient gets tired while eating, order food the patient likes. Assist with or provide mouth care.</td>
<td>Has pale or blue lips.</td>
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<tr>
<td><strong>C</strong> Cough</td>
<td>Note a dry hacking cough.</td>
<td>Is more short of breath.</td>
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<tr>
<td>Congestion</td>
<td>Notice frothy or bloody sputum. Report change in alertness or confusion. Use oxygen, if ordered. Falls prevention-assist with transfers and mobility, watch for dizziness. Ask about chest pain or pressure.</td>
<td>Has a hacking cough.</td>
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<tr>
<td>Confusion</td>
<td></td>
<td>Has swelling in the feet, legs, hands, stomach.</td>
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<td>Chest pain</td>
<td></td>
<td>Isn’t eating enough.</td>
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<td><strong>E</strong> Edema-</td>
<td>Notice if rings or shoes get tight. Protect legs &amp; feet from injury. Apply elastic stockings, if ordered. Record weights accurately. Offering toileting regularly. Watch for ↑ urine at night, and ↓ urine during the daytime.</td>
<td><strong>The patient says:</strong></td>
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<tr>
<td>Swelling Weight gain</td>
<td></td>
<td>“I can’t lie down, I get too short winded.”</td>
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<tr>
<td>Elimination</td>
<td></td>
<td>“My chest hurts.”</td>
</tr>
<tr>
<td><strong>S</strong> Shortness of Breath (SOB)</td>
<td>“I’m not feeling well today.”</td>
<td></td>
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<tr>
<td></td>
<td>Note SOB at night, unable to sleep. Note SOB from simple activities ↑ Head of bed, use extra pillows, sit up on the side of the bed. A cooling fan may help breathing. Offer mouth care, ice chips, lip balm. Provide emotional support. Hand or back massage may ↓ anxiety.</td>
<td>“I feel worse than usual.”</td>
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<tr>
<td></td>
<td></td>
<td>“I can’t catch my breath.”</td>
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<tr>
<td></td>
<td></td>
<td>“I’m too tired to do anything.”</td>
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<td></td>
<td></td>
<td>“I am exhausted.”</td>
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<tr>
<td></td>
<td></td>
<td>“I feel bloated.”</td>
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<tr>
<td></td>
<td></td>
<td>“I feel sick to my stomach.”</td>
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</table>

**Fig. 1.** The FACES pocket cared (modified from the “Who is the patient with heart failure?” Heart Failure Society of America, 2002).
as demonstration and return demonstration, case studies, role play simulations, unit-based sessions or classroom sessions, and bedside clinical teaching (see Table 2). Most sessions were conducted on the clinical unit or at the bedside and offered multiple times so that staff from all three shifts could participate. Practical educational materials such as the FACES card (Fig. 1) and clinical worksheets were developed to aid recall and application in practice (American Medical Directors Association, 2002; “2006 HFSA Comprehensive HF Practice Guideline”, 2006).

**Connecting guidelines and education to daily practice**

Applying principles from diffusion of innovations, the Geriatric Advanced Practice Nurse explored staff perceptions by comparing the new approach to their current practice which did not include HF assessments, made modifications to the worksheets so they were easier to understand and complete, noted how assessments could be integrated into routines, and provided a clearer way to document/report symptoms to medical providers. One unit pilot-tested the new symptom recognition procedures to see how they worked and to identify any barriers. Staff “buy-in” was enhanced during this process of evaluation and revision. The innovation-system fit (Greenhalgh et al., 2004; Rogers, 2003) between guideline recommendations and the characteristics of the setting, residents, daily routines, and staff who would implement the new practices was also considered.

**Evaluation**

The focus of the evaluation was to determine the feasibility of different teaching–learning strategies for translating new evidence about HF symptom recognition to nursing home staff. The logistics of using different teaching methods given staffing shortages and scheduling constraints common in many clinical settings were considered in the feasibility evaluation. We also evaluated the sustainability of a systematic approach to HF symptom recognition.

**The Connected Learning Model: results**

**Staff training**

Twenty-six education sessions were conducted from June through December 2004. Session attendance ranged from 3–6 for bedside teaching and 6–20 for unit-based and classroom sessions. A training notebook was provided to the staff educator, who attended many of the sessions. For staff orientation, a self-instructional module was developed. The majority of nursing staff participated.

NAs reported that bedside clinical teaching with physicians increased their knowledge about the care of their patient. LPNs and NAs also favored being part of a teaching team mentored by the Geriatric Advanced Practice Nurse. One LPN co-taught a session on variations in HF symptom presentation. This experience gave her confidence to use her teaching skills in her charge nurse role. Peer teaching sessions provided the opportunity for LPNs and NAs to share their knowledge about caring for HF patients. The chance to be “the teacher” acknowledged special expertise possessed by some staff. For example, in a bedside teaching session on how to obtain the apical-radial pulse, one LPN discussed her previous job on a cardiac telemetry unit, and offered clinical tips. Several senior nursing leaders were pleased to observe LPNs teaching staff about symptom monitoring.

In an example of peer teaching, one NA portrayed a patient with acute HF and other NAs took turns interviewing the “patient” about her symptoms, observed for signs, and completed the HF worksheet. An NA serving as a peer teacher provided tips and feedback and the Geriatric Advanced Practice Nurse explained how symptoms may differ among patients and the link between emerging symptoms and acute HF. NAs often lack the appropriate vocabulary to describe signs and symptoms, but through teaching sessions such as this, they were able to learn more precise vocabulary to communicate observations and changes in symptoms. The learn-by-doing approach addressed common barriers to adoption of new care practices such as perceived lack of time, low confidence in skills performance, inability to see positive effects, or lack of relevance to patient care (Lekan-Rutledge, 2000).

On-the-job skill competency evaluation was conducted by the Geriatric Advanced Practice Nurse to verify learning, answer questions, review HF worksheets and provide affirmation and positive feedback. During class sessions, oral and written quizzes were used periodically to stimulate discussion, generate interest, and reinforce learning.

**Implementation of new care practices**

Quality monitoring to assess staff completion of HF worksheets was conducted by the Geriatric Advanced Practice Nurse and an RN supervisor. Chart audits and nursing rounds verified completion of the worksheets and identified changes in patient status. The night RN supervisor assumed leadership for conducting audits, and provided a vital connection with night staff.

Although over time there was some drop-off in completion of the HF worksheets, medical staff observed that LPNs maintained timely reporting of new HF signs and symptoms. Prior to the program, staff had limited knowledge about HF, however, medical provider feedback indicated that following the education programs, nursing staff were more attentive to symptoms and frequently used the FACES card. Telephone and written reports by the LPN and RN about HF improved. Medical staff also noted that communication about care improved overall, suggesting a carry-over effect leading to improved assessment and communication about other acute and chronic illnesses.

As HF symptom reporting became more reliable, attention to other care processes emerged. For example, daily weight measurement was re-examined through literature review, cardiology consultations, and discussion with the medical and nursing leadership. After reaching consensus, a new policy was implemented that achieved more consistent and accurate weights and minimized patient discomfort.

The quality of interactions between medical providers and nurses improved. The medical director noted that nurses included more information about the patient’s status, such as vital signs and a more detailed summary of their symptoms. One nurse practitioner noted that telephone communication was more accurate and complete, and she felt more confident ordering treatment rather than hospitalizing a resident:

“When nurses called me they were better prepared with information about the patient’s status, and they also called me more quickly with problems. I think the link between the nurse practitioners and the nurses is greatly improved”.

Several LPNs and NAs said that relationships with medical providers were more satisfying since they had more direct contact during bedside teaching and unit-based sessions. The medical staff’s participation in these learning experiences fostered positive relationships, mutual respect, and a better understanding of the LPN and NA role. Physicians expressed appreciation for the LPNs...
and NAs wealth of knowledge about their patients and the caring practices they used to help patients manage symptoms during activities of daily living.

Discussion

Staff education to implement evidence-based practices is complex and often fails. The diffusion of innovations framework, operationalized in the Connected Learning Model, offers some guideposts for accelerating clinical practice guideline adoption. Use of a Geriatric Advanced Practice Nurse increased interactions among nursing and medical leaders and nursing staff to implement a systematic approach to HF symptom recognition and reporting. Strengthening communication linkages among staff and providers through collaborative learning opportunities increased the organization’s learning capacity and its ability to use new information to improve care. Through integrated efforts that combined evidence-based approaches to practice redesign, interactive education and practice-reinforcing strategies (Titler et al., 2007), the Geriatric Advanced Practice Nurse had a positive impact on improving the translation of knowledge into practice. A Canadian study of a knowledge translation intervention to promote evidence-based home care for client-driven care (McWilliams et al., 2008) found that “project leaders” were important in developing social relationships that supported successful implementation. Similarly, the Connected Learning Model underscored the importance of social relationships and leadership in the adoption of new care practices. As demonstrated by the National Practice Development unit in Australia, translation of evidence into practice requires establishment of cross-organizational structures and processes including communication that facilitate their integration into existing structure (Henderson et al., 2008). The Connected Learning Model offers a new approach to education through bedside clinical teaching and unit-based instruction for learning new skills under real-world circumstances. The goal of the teaching session is to orchestrate an experience that meets both the patient’s and learner’s needs and promotes sustainability of evidence-based practices.

From an international perspective, the role of the advanced practice nurse is evolving. The International Council of Nurses established the Nurse Practitioner/Advanced Practice Nursing Network to address societal issues related to health services and the aging population (Nurse Practitioner/Advance Practice Nurse Network). A recent survey of 34 countries found a variety of credentialing processes, titles, and roles. About 90% were masters’ prepared, 62% identified geriatrics as their specialty and 44% held positions in nursing homes. The Connected Learning Model may facilitate extending these roles into geriatric care settings. In countries without educational distinctions for advanced practice, or when advanced practice nurses are not available, innovative nursing roles have led practice innovations in nursing homes. In the United Kingdom, the Older People’s Specialist Nurse (Hayes and Martin, 2004) address care of the aged in nursing homes by combining geriatric and leadership expertise in clinical care. Also, nursing educators with joint appointments in university and practice settings work to narrow the gap between theory and practice (Rowe, 2008). In Taiwan, an academic–practice partnership with a nursing home can effectively focus on enhancing the education of nursing home staff with involvement of nursing students (Chang and Corgan, 2006), a model similar to the teaching nursing home model in the US (Mezey et al., 1997; Mezey et al., 2005).

The Connected Learning Model offers an innovative approach to continuing education and practice improvement through linkages that promote inter-professional communication and stronger relationships that may have substantial impact on quality of care (Anderson et al., 2005). Although traditional classroom educational approaches are common, evidence suggests that knowledge-based education alone cannot be relied upon to significantly change and sustain new care practices (Ribelin and Neufeld, 2006; Titler et al., 2007). Knowledge gained in classroom instruction may not take hold in clinical practice because of barriers that hinder application (Gifford and Edwards, 1994).

Conclusion

Implementing clinical practice guideline-informed nursing care is complex and requires multiple strategies for success. Broadly trained clinical nurse leaders are needed to lead in guideline implementation and to develop educational approaches that strengthen nursing staff competence. In settings such as nursing homes where RN expertise is limited, HF symptom recognition and timely intervention is possible when nursing staff have sufficient knowledge and skill (Goldman et al., 2004) and supervision (McKenna et al., 2004) that can serve to reduce hospitalization, morbidity, and mortality (Chin and Goldman, 1997). The initial success of the Connected Learning Model in one setting provides support for its continued development as a guideline implementation model. Further study is needed to identify the factors that are instrumental in clinical practice guideline adoption and the role of RNs and advanced practice nurses. Building capacity for guideline implementation among diverse nursing staff is critical in order for patients to receive the benefits of evidence-based care.

Conflict of interest statement

None declared.

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