

Visions
The Journal of Rogerian Nursing Science



Martha E. Rogers 1914-1994

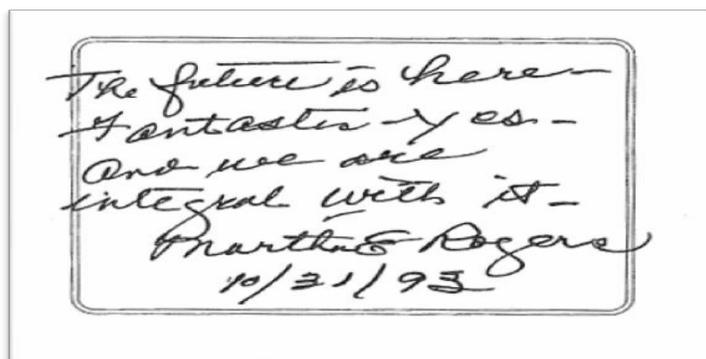


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Author Guidelines

Visions: The Journal of Rogerian Nursing Science is the official journal of the Society of Rogerian Scholars providing readers with essential knowledge about Rogers' Science of Unitary Human Beings (SUHB). The journal is a peer-reviewed and CINAHL indexed. The journal aims to assist scholars who are interested in discovering, understanding and disseminating nursing knowledge related to SUHB. An Editorial Board and peer review panel of experts in SUHB who ensure that only the most current and comprehensive manuscripts that help to improve the understanding of Rogerian Science are published support the Journal.

Visions accepts papers that contribute significantly to Rogers' Science of Unitary Human Beings including concept analyses, theoretical perspectives, original research, integrative reviews, historical perspectives, clinical cases, and those that address education.

Manuscript Submission

Papers submitted for consideration are assumed to be original, not previously published, and not under consideration by any other journal. Manuscripts are accepted for review at any time during the year. Each manuscript will undergo a peer-reviewed process. Final decision is by editor.

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Manuscript Preparation

1. Type manuscripts double-space leaving margins of at least one inch. Number the pages consecutively beginning with the first page of text. Begin each element below on a new page:
2. Title page: Write a brief, specific, and descriptive title. Include the full names of all authors, their degrees, titles, affiliations and any acknowledgments of financial support. Please also list the role each author had in preparing the manuscript.
3. Abstract: Prepare a structured abstract. Identify three to five search terms for indexing purposes.
 - a. For **research reports** (100-120 words): purpose, methods, findings, conclusions, implications for nursing practice.
 - b. For **other articles** (75-100 words): purpose, data sources, data synthesis, conclusions, implications for nursing practice.
4. Text: Prepare paper in English using standard manuscript form according to the Publication Manual of the American Psychological Association (APA), 6th ed., 2009.
5. The overall length should be 12-15 pages inclusive of tables and figures.
6. Word count should be 4,000 for a research paper and 3,000-5,000 for other papers exclusive of tables, figures and references.
7. Tables and figures should be limited in number to three.

8. Use headings and subheadings as described below.

Research manuscripts:

1. Background
2. Purpose/objectives
3. Design for quantitative or Research Approach for qualitative
4. Setting
5. Sample for quantitative or Participants for qualitative
6. Method for quantitative or Methodological Approach for qualitative
7. Main research variables for quantitative, not applicable for qualitative
8. Findings
9. Conclusions
10. Implications for nursing knowledge
11. Knowledge Translation – Describe in 3-4 sentences how this work contributes to nursing practice, research, policy and/or education.

Other papers:

1. Background
2. Problem identification
3. Approach to integrative review, concept analysis, etc.
4. Data sources/literature search
5. Evaluation of findings
6. Synthesis of findings
7. Conclusions
8. Implications for nursing knowledge
9. Knowledge translation – Describe in 3-4 sentences how this work contributes to nursing practice, research, policy and/or education.

Also, please note:

1. Tables: Number tables consecutively, cite each one in the text, type each one on a separate page, and place at end of the references.
 2. Figures: Number figures consecutively, cite each one in the text, print each one on a separate page, include a title for each one, and place at end of the references.
- References: Use APA format. Cite all references in the text.
Authors are responsible for accuracy of all reference citations.
Publication may be delayed if references are incorrect.

Exploring the Experience and Impact of Therapeutic Touch Treatments for Nurse Colleagues

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ABSTRACT

Background: Therapeutic Touch (TT) reduces anxiety and stress while improving comfort and well-being in persons receiving TT. Providers and recipients of TT benefit from treatments. Nurses provide care on oncology and respiratory units which is physically and emotionally demanding.

Research question: What is the experience and impact of providing and receiving Therapeutic Touch treatments on nurses working in oncology and respiratory nursing?

Specific Aims/Hypothesis: Hypothesis: Participants, who receive and offer TT interventions, will have

significantly lower cortisol level, decreased blood pressure and heart rate and reduced anxiety levels, and significantly improved comfort and well-being.

Specific Aims:

1. To test the efficacy of a TT intervention in influencing the level of stress, sense of comfort and well-being by:

- a. Comparing the physiologic stress markers of cortisol, heart rate, systolic and diastolic blood pressure levels and state anxiety levels (STAI) of nurses offering and receiving TT pre and post intervention,
- b. Comparing the comfort and well-being as measured with visual analog scales pre and post intervention.

2. To qualitatively understand the experiences of nurses providing and receiving Therapeutic Touch (TT) on inpatient oncology and respiratory care units.

Methodology: Nurses who are certified to do TT provided (TT) to work colleagues who were willing to receive a TT treatment. Before and after each treatment vital signs; a visual analog scale for level of comfort and wellbeing; Spielberger state-trait anxiety survey (STAI); and oral swab for cortisol levels were collected. After the treatments, nurses providing and receiving TT were asked to participate in focus groups

Analysis: Changes in heart rate, blood pressure, cortisol levels and perceived level of comfort and well-being were analyzed through a series of paired t-tests. Focus group data was transcribed and analyzed using content analysis.

Key Words: Therapeutic touch, anxiety, wellbeing, salivary cortisol

Throughout history, the use of touch has been a hallmark of nursing care. For example, a back rub before sleep is used regularly to promote relaxation and induce sleep. This strategy offered the nurse an opportunity to interact and connect with patients in a therapeutic and healing manner. A formal version of touch, called Therapeutic Touch (TT) is based on Roger's Science of Unitary Human Beings (1992), but different in that Krieger proposes the energy field of a person and the environment are two different entities, whereas Roger's describes them as being integral and inseparable from one another. TT is defined as an intervention derived from the laying on of hands. The hands help to transfer energy from a person serving as a healer to another person, to help or heal that individual (Krieger, 1993; Mulloney & Wells-Federman, 1996).

Krieger stated "during TT the healer acts as a human support system, [his or her] own health energy field providing the scaffolding to guide the re-patterning of the healee's weakened and disrupted energy flow. Such support is oriented toward stimulating the healee's own immunological system, for it is the healee who heals her or himself" (Krieger, 1993, p.13).

TT has been studied and used by nurses for over thirty-five years (Barron & Coakley, 2008, Coakley, 2001, (Heidt, 1979; Krieger, 1993; Macrae, 1987). TT has been studied in diverse settings with people experiencing various health conditions (Heidt, 1979, Krieger, Peper, & Ancoli 1979; Meehan, 1985; Parkes, 1985, Quinn, 1982; Turner, Clark, Gauthier, & Williams, 1998). Results of these investigations suggest TT successfully improves comfort, promotes relaxation, and reduces anxiety in the person receiving TT (Heidt, 1990; Quinn &

Strelkauskas, 1993). Researchers have demonstrated both providers and recipients of TT benefit from the treatments (Coakley 2001; Heidt, 1990; Krieger, 1979). For example, Krieger (1979) reported that 250 healers in North America who practiced TT described the TT experience as having benefits for the practitioners as well as the recipients. Heidt (1990) used grounded theory to study the experience of TT for both practitioners and recipients. The findings of her investigation indicated that in many instances, the descriptive experiences of the patients during treatment paralleled those of the nurse.

Coakley (2001) found that both providers and recipients of TT described feeling more relaxed, more focused, and calmer following TT treatments. When one person interacts with another, there is an interaction of fields as they become interconnected with the other. When a nurse intentionally and purposefully employs TT with another, the energy fields are interconnected in a mutual exchange, which potentiates the possible benefit to each person.

The current practice demands and effects of stress on nurses are well documented (McVicar, 2003; Kallaith & Morris, 2002; (McVicar, 2003; Medland, Howard-Ruben, & Whitaker, 2004) among others. Nursing is fast-paced, demanding, and although extremely rewarding, can be emotionally and physically exhausting. Nursing practice requires high degrees of technical, interpersonal, and ethical expertise, physical and emotional stamina, and frequent witnessing and addressing of suffering contributing to increased stress.

The stress response is initiated in the hypothalamus-pituitary-adrenal axis (HPA) and the sympathetic nervous

system, which senses and responds to stressors in a cascading and appropriate adaptive reaction (Chrousos, 2009; McEwen, Nasveld, Palmer, & Anderson, 2012). This process stimulates the adrenals to release appropriate levels of cortisol. Over time and with repeated triggers of stress, cortisol levels remain high negating the appropriate physical and emotional responses to stress, (Feder, Nestler, & Charney, 2009). The HPA and sympathetic nervous system pathways activate an increased cortisol response leading to an inflammatory immune response, increased heart rate and blood pressure (McEwen, 2008; McEwen et al, 2012).

Nurses working in such high intensity practice settings have reported anecdotally that TT is helpful in reducing their perceived stress levels when they receive a treatment during a busy shift. To date, there are no studies to address using TT to reduce stress during their work shift.

Purpose

The purpose of this investigation was to explore the experience and impact of providing and receiving Therapeutic Touch treatments on nurses working in oncology and respiratory nursing.

Methods

The present mixed method study was designed to test the hypotheses that nurse participants who receive and offer 10-minute TT interventions will have significantly lower (1) cortisol, (2) heart rate and blood pressure, and (3) state anxiety levels, as well as significantly improved (4) overall comfort and (5) general well-being following the TT intervention. The present study also was designed to describe the experiences of the nurses who offered and received TT during the study.

Setting and Participants

A convenience sample of staff nurses on the Bone Marrow Transplant Unit and the Respiratory Acute Care Unit in a large academic center in the northeastern United States were invited to participate. Eligibility criteria included nurses who were certified to do TT and provided treatments and nurses who were willing to receive a TT treatment and were willing to discuss this experience.

Protections of Human Subjects

Before commencement of this study, institutional Internal Review Board (IRB) approval was obtained. The PI assured privacy and confidentiality for all the research participants. Per IRB, Written consent was waived.

Procedure Quantitative

The sequential mixed method study included collection of quantitative measures of stress (cortisol, heart rate and blood pressure), anxiety, comfort, and overall well-being, as well as qualitative reports of the participants' experiences of TT. The quantitative portion of the study was a pretest-posttest design.

Both nurses in the dyad of those providing and those receiving TT had their vital signs and salivary cortisol levels assessed, and completed the Spielberger (1970) State-Trait Anxiety Inventory and visual analog scales before and after the TT intervention. The nurses providing the TT intervention recorded the names, dates, and times of the intervention and noted blood pressure and heart rate, and they administered the STAI and VAS. Specific demographic data were not collected.

Instruments

Data collection of physical measures for the study occurred before and immediately following each treatment for the nurse

receiving the TT treatment. Blood pressure was measured using a sphygmomanometer and a stethoscope. Heart rate was measured by counting the radial pulse for one minute. Respiration was measured by counting inspirations and expirations for one minute. All blood pressure, heart rate, and respiration measurements were taken by one of the RNS providing TT treatments. Data was recorded on the data collection form.

Anxiety

The Spielberger State/Trait Anxiety questionnaire (STAI): The STAI was developed to investigate state/trait anxiety in normal adults. The State Anxiety tool STAI (Form Y) contains twenty items that asks respondents to describe how they feel “right now” to a series of 20 questions. The internal consistency of the STAI (Form Y) as measured by Alpha coefficients in a normative sample resulted in an alpha coefficient of .92. Repeated measures using this instrument have reported similar levels of consistency. Spielberger established construct validity with a large group of college students under stress of final examinations and found that the stress prior to testing was significantly higher than following the testing period. These findings have also been supported in subsequent studies by (Sarason & Spielberger, 1975; Spielberger, 1995, Heidt, 1981, Quinn, 1982 and Coakley, 2001).

Estimates of comfort and well-being visual analog scales

The visual analog scale (VAS) provided one way to obtain the Nurse’s estimates of comfort and well being. A VAS is a scale determined by a straight line that represents the continuum of the dimension being measured with anchors at either end to help delineate boundaries of a measure (McDowell & Newell, 1987). The scale, conventionally 10 cm long may be printed either vertically or

horizontally. Each end of the scale is anchored with labels that indicate the range being considered, eg; absence of pain to extreme pain. The scale requires about 30 seconds to complete with a reported correlation of .99 (McDowell & Newell, 1987). Additionally, correlations between vertical and horizontal scales range from 0.89 to 0.91 (McDowell & Newell, 1987). Levels of well being and comfort were measured using the VAS.

Salivary cortisol

Cortisol, an important hormone in the body, is secreted by the adrenal glands and involved in proper glucose metabolism; regulation of blood pressure; insulin release for blood sugar maintenance; immune function and inflammatory response. Cortisol has been linked with adverse health outcomes when elevated (Kiecolt-Glaser, 1998, McCain, 2005). It is well documented in the literature that salivary cortisol is a reliable reflection of free serum cortisol levels and has been used as a measure when investigating physiologic responses to stress (Kahn, Maxwell & Barron, 1984, Kirschbaum & Hellhammer, 1989; Kirschbaum & Hellhammer, 1994; Barker, Knisely, McCain, & Best, 2005). In this study, salivary Cortisol levels were measured immediately before the TT intervention and immediately after the TT intervention.

Qualitative

Nurses who participated in the study were invited to focus group interviews to share their experiences of offering and receiving Therapeutic Touch. A qualitative descriptive approach was utilized during this aspect of the study and data were analyzed using content analysis. The focus group questions are included in Table 3. A master’s prepared nurse who did not work

on either unit and has expertise in data collection conducted the focus groups. The focus group interviews were audio-taped, transcribed verbatim, and analyzed).

Analysis

The quantitative data was entered into SPSS and pre post measures were analyzed using paired *t* tests. The qualitative data was analyzed using content analysis as outlined by Downe-Wamboldt (1993). To ensure rigor, the authors independently analyzed the interview data by conducting a line-by-line analysis for initial identification of themes. They then considered together their independent findings, synthesized and refined their understandings, and returned to

the data to confirm the accuracy of their findings. Two overall themes emerged.

Results: Quantitative Data

Table 1 represents the nurses who provided the TT to their colleagues on the two units. Eight nurses provided TT on their staff nurse colleagues. There were no restrictions on the number of times the staff nurses could have a TT so some staff nurses had multiple treatments.

Table 2 represents the staff nurses who Received a TT treatment during their work shift. No other demographic details were collected. Table 3 represents the focus group questions asked of the nurse participants who either providing or received TT.

Table 1. TT providers paired *t* tests

Variable	Pre mean	Post mean	d	t	P
BP Systolic	109	111	-1.67	-1.09	0.286
BP Diastolic	68	68	0.44	0.351	0.729
HR	76	76	0.44	0.224	0.825
Resp	17	17	0.67	1.39	0.175
VAS comfort	7.43	7.98	-0.56	-3.02	.006*
VAS well being	7.98	8.48	-0.50	-3.74	.001*
Cortisol	0.28	0.30	-0.02	-1.04	0.306
STAI total	1.608	1.38	0.228	6.02	.000*

Table 2 TT Recipients

Variable	Pre mean	Post mean	d	t	p
BP Systolic	109	108	1.42	1.04	0.308
BP Diastolic	65	66	-1.23	1.17	0.250
HR	66	64	2.65	2.02	0.54
Resp	17	16	1.18	2.34	0.029*
VAS comfort	6.40	7.92	-1.51	6.30	.000*
VAS well being	6.90	8.25	-1.34	7.25	.000*
Cortisol	0.29	0.36	-.069	2.61	.015*
STAI total	1.86	1.51	0.345	5.24	.000*

Table 3 Focus group questions

-
1. How did offering/receiving Therapeutic Touch affect you?
 2. How did Therapeutic Touch affect you/your colleague?
 3. Please describe the effect of receiving or offering TT on your sleep after receiving the intervention.
 4. How did Therapeutic Touch affect you/your colleagues over time?
 5. How did Therapeutic Touch affect you/your colleagues over time?
 6. What is the impact of having a number of nurses offering Therapeutic Touch on the unit?
 7. How does the offering of Therapeutic Touch contribute to the healing environment of the unit?
-

Findings: Qualitative Data The focus groups were conducted on each of the participating units and included both the providers and the recipients of the TT intervention. The analysis of the experiences of offering and receiving Therapeutic Touch described by the nurses revealed two overall themes.

Theme One: TT promoted healing, comfort, and relaxation for nurses offering and receiving the research intervention

Nurses described the benefits of offering TT to colleagues in relation to the impact on those receiving TT and for the nurses offering the intervention. All of the nurses who received TT and the nurses who offered it described relaxation during and after the intervention. One nurse was disappointed to

learn that her blood pressure increased following the intervention, which surprised her, as she was feeling more relaxed.

Generally, the participants experienced increased energy and overall enhanced sense of well-being following TT. Nurses offering TT were moved to realize that they helped colleagues feel better through their intervention. The comfort, peace, and healing experienced by the nurses are revealed in the following quote: "I was very comfortable and at peace when she performed the therapy."

One nurse described how TT helped to relieve pain she was experiencing that day and stated the following:

I had a really sore back that day and when [the nurse interventionist] did it, she said she could feel right exactly in the space and I thought my back felt better afterwards.

Nurses who had provided TT to patients in the past found it validating to receive positive feedback from peers recognizing that patients might feel the need to respond positively to a nurse trying to intervene to provide comfort. One nurse described it this way.

.. it was also good to have feedback from a peer rather than from a patient because you would think that patients, of course, would say that they feel much better because they are sick, but from a peer that you feel there's nothing going on with them, but then hearing all the positive things from them, it was really eye opening,

Participants described the benefits of either providing or receiving TT, despite the challenges of a busy inpatient unit. Recipients described wondering if they should take time to receive TT, but once they had a treatment, they recognized the calm they experienced and ability to focus as benefits. The providers of TT felt challenged by trying to center prior to giving a treatment on a busy unit. One nurse described the difficulties this way: “You can always find the time, but calming down... not thinking about the things I need to do, that’s the struggle”

However, providers overwhelmingly realized that providing TT to a colleague allowed them to feel centered, and through helping a colleague contributed to the creation of a healing environment.

Theme Two: The nurses identified the benefits of Therapeutic Touch for their patients and wanted to expand the availability of Therapeutic Touch

Although the research was focused on TT as an intervention for nurses, the participants readily related their experiences with TT to potential benefits for their patients. Drawing from their experiences from this study as well as being on an inpatient unit where TT has been offered for many years, the nurses described the benefits of TT. This was both on the individual patient level as well as the unit level. Overall, they described that having a large number nurses be able to offer TT created a more healing environment.

They described the need for more TT training availability. They also noted the direct benefits to patients when nurses are relaxed and experience increased energy as a result of the TT they experienced. The following quotes illustrate the nurses’

recognition of the value of TT for patient-care:

Absolutely (there should be more TT training to nurses on the unit). I mean just hearing how much feedback from people that said how much it helped them relax, then, yes, absolutely. I think it will help not only for them, but if they can do that to other patients here, especially for us because we deal so much with anxiety and shortness of breath.

Another nurse described the need for more nurses to be trained in TT so that it could be offered to more patients as an intervention. She said:

I think a lot of us would like to be trained in it (TT)...because it would be nice if your patients wanted it and you could say I can do this and you happen to have a minute – if you could do that for them.

One of the nurses, referring to the benefit she witnessed when one of her patients received TT from a colleague earlier said:

So she gives it to him before bed every time that she’s here. So he gets it frequently and I think it does help quite a lot, especially because he has a significant psych history and some issues with anxiety and I think it absolutely helps him sleep.

Every nurse who participated, whether she offered or received TT, described TT as a valuable intervention for promoting comfort, relaxation, and healing in the workplace. Challenges relative to taking the time from patient care to center were also described.

Discussion

Both recipients and providers of TT had statistically significant differences in the assessment of anxiety, comfort, and wellbeing as assessed by STAI and VASs. State anxiety decreased and levels of comfort and wellbeing increased. Further, the nurses who received TT had a reduction in the respiratory rates, blood pressure and heart rates. Salivary cortisol levels did not change in either group. Overall, the findings of the study support the benefits of TT identified in prior research (Coakley, 2001, Barron et al, 2008, Coakley & Duffy, 2010) and validate the hypotheses tested with the exception of the hypothesis for the salivary cortisol results.

Vital signs and anxiety have been tested in relation to TT for years and have been found to decrease following a treatment. Coakley measured serum cortisol in 2010 and found that cortisol did decrease following a TT treatment, however many patients did not wish to have their blood drawn so refused participation in that study. In this current investigation, Coakley et al choose to use salivary cortisol as a biomarker because it is less intrusive. Staff nurses were willing to do salivary cortisol testing however because of the fast paced nature of the inpatient care units, often were very limited in the time they could devote to the study and reported often checking salivary cortisol shortly after eating and after doing the TT.

Salivary cortisol did not decrease significantly as expected. This may be due to several factors. One concern that was raised during the focus group discussions was that the nurses had to find time to do a TT treatment in the midst of a very busy work shift so many times they offered or received the treatment and measured the cortisol, but may not have waited the 15-30 minutes since the last food or beverage which is the recommendation for assessing

salivary cortisol (Kirschbaum, 1994). Another question that arose during the analysis of the data is in relation to the timing of the post-TT salivary cortisol assessment. The cortisol swabbing was done immediately following the TT interventions because of a lack time. However, there is literature that suggests waiting for 30-45 minutes, to check the post intervention cortisol level may have allowed enough time to yield different findings (Barker, et al, 2005). Further investigation of the procedures for the assessment of salivary cortisol levels following a research intervention is warranted.

Challenges related to offering TT on a busy inpatient unit, in spite of the benefits recognized by the nurses, validated earlier findings by Barron, Coakley, Fitzgerald, and Mahoney (2008). Nurses are integral to the environments in which they work and as such found it difficult to arrange a quiet location and uninterrupted time for the intervention. Nurses described difficulty with centering in the midst of a busy work shift as a major obstacle, as they did in the earlier study (Barron et al). Given the benefits for the nurses, ongoing research to explore models for creating that opportunity in the workplace is clearly indicated.

Implications

In this study, offering and receiving TT was a valuable strategy for enhancing the nurses' sense of well-being and comfort and decreasing anxiety when offered during the work day. Further research on offering TT during a busy work shift is indicated both to expand these findings and to address the questions of timing and procedure for the most accurate assessment of salivary cortisol levels. Nurses in this study expressed interest in participating in future research focused on the offering of TT during the work shift among nurse colleagues.

Given the well-documented stressors of nursing practice, and implications of stress on nurses' health (Blum, 2014), the emphasis on enhancing the wellness of nurses is of great significance. Research focusing on strategies that promote wellness at work for nurses is timely and consistent with calls from the American Nurses Association (ANA), (Blum, 2014; Letvak, 2014). According to the American Holistic Nurse Association (AHNA), self-care and self-healing is critical to being able to provide nursing care because holistic nurses recognize that they cannot facilitate healing unless they are in the process of healing themselves. So important is the concept of self-care to holistic nursing that it was incorporated into the AHNA Standards of Holistic Practice in 2003 and the AHNA Scope and Standards of Practice, Core Value 5, in 2007. This research supports the notion that nurse should help to heal themselves and their colleagues as part of creating healing environments for patients.

Limitations

There are limitations of this study related to the challenges of conducting research in an in vivo clinical setting. Staff wanted to do TT and participate in the study however the challenges of caring for acutely ill patients is always their first priority so they found ways to "fit" the study into their busy work day and often measured salivary cortisol shortly after eating and shortly after doing the TT.

Conclusion

These study findings comparing self-report measures of STAI, well-being, and comfort of nurses offering and receiving TT suggests these measures improved post intervention. The nurses who received TT had a reduction in the respiratory rates, blood pressure and heart rates. Blood pressure and heart rate did not change in nurses who provided TT and

cortisol levels were unchanged in each group. Nurses overwhelmingly reported TT as a positive intervention to promote calmness and a healing environment. Not surprisingly, there are challenges to implementing such a protocol on a busy inpatient unit. This indicates more research is needed to support these study findings with a goal of broader implementation of healing environments aimed at improving patient care outcomes.

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Rural Caregivers of Persons with Dementia: Review of the Literature Guided by Rogers' Science of Unitary Human Beings

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ABSTRACT

The purpose of this paper is to discuss a literature review that identified four manifestations for rural caregivers of persons with dementia: 1) access to health care, 2) unique rural needs, 3) application of knowledge, and 4) rural cultural competence. This review critically evaluated the available evidence from the published scientific literature on informal/family dementia care in rural and remote settings to assess the current state of knowledge, identify support implications, and make recommendations for future research. Utilizing Rogers' conceptual framework for nursing science, the Science of Unitary Human Beings, the authors were able to describe the irreducible and integral nature of rural caregivers of person with dementia and their rural environment. Four databases were searched between October 17, 2015 and December 16, 2015. The databases included Medline, PsycInfo, EBSCOhost, and CINAH abstracts. Search terms for all databases included: (dementia or Alzheimer's*), (rural), and (care* or support or service*). The authors concluded that access to health care, uniqueness of rural communities, application of dementia and cognitive health knowledge, and cultural competence including cultural self-awareness allow for nurses to be able to promote health, well-being, and human betterment.

Key Words: Cultural Competence; Dementia; Rural Caregivers; Science of Unitary Human Beings

Introduction

An estimated 5.3 million American adults have Alzheimer's disease and five million of these are over the age of 65 (Alzheimer's Association, 2015). By 2025 the United States is expected to experience an increase of 14 % in the number of people with Alzheimer's (Alzheimer's Association, 2015). The Southern and Western parts of the U. S. are expected to experience a 50% greater increase in number of people with Alzheimer's disease by 2050 (Alzheimer's Association, 2015). In Arizona the incidence of Alzheimer's is expected to increase 67% (Alzheimer's Association, 2015).

The most common initial symptom is a gradually decreasing ability to remember new information. Other early symptoms include challenges in planning or solving problems, difficulty in completing familiar tasks, confusion about time and place, difficulties in comprehending visual images and spatial relationships, and problems with words in speaking or writing (Alzheimer's Association, 2015).

Currently, there are no pharmacological therapies for early-stage dementia. However, early-stage diagnosis of dementia has been accepted as beneficial because non-pharmacological treatment to slow progression can begin, and legal and financial planning can be addressed while the care-recipients are able to participate in decision making. Education and support services for the caregiver can also be introduced sooner.

Caregivers of those with Alzheimer's are daughters, wives, husbands, sons, grandchildren, nieces, nephews, partners, friends, and neighbors. It is estimated that while 25% of the population of the United States live in rural areas, this population is distributed over 90% of the landmass (U. S. Department of Health and Human Services, 2011; Mason-Baughman & Kisiday, 2012). The majority of rural older adults with

Alzheimer's live at home and are cared for by these informal caregivers, family members, friends, or neighbors. For caregivers of people living with Alzheimer's, however, residing in a rural community adds an increased complexity to care.

Caregivers in rural settings face challenges such as fewer available formal services, fewer health care providers and health education services, difficulties with transportation, weather problems in winter, and isolation (Family Caregiver Alliance, 2015). For example, Northern Arizona is a geographical region that is rural and underserved in regard to dementia services (Arizona Department of Economic Security, 2016). Travel to memory centers is often many hours away, making it difficult for informal caregivers to find and/or participate in support groups and programs. Also, health care providers are few and far between (Sun, Kosberg, Kaufman, & Leeper, 2010; U. S. Department of Health and Human Services Health Resources and Services Administration (HRSA), (2014).

The challenges of rural caregivers of persons with dementia have been mostly invisible (Sun, Kosberg, Kaufman, & Leeper, 2010). Rural caregivers of persons with dementia tend to rely on informal supports and may report more psychological distress and burden than urban caregivers (Castro, King, Houseman, Bacak, McMullen, & Brownson, 2007).

Method

Three researchers used a controlled vocabulary, keywords, and key phrases to identify relevant articles describing rural caregivers of persons with dementia. Four databases were searched between October 17, 2015 and December 16, 2015. The databases included Medline, PsycInfo, EBSCOhost, and CINAH abstracts. Search terms in all databases included: (dementia or

Alzheimer's*), (rural), and (care* or support or service*). An asterisk indicates that all terms that begin with that root were included in the search.

The search was limited to English language studies published from 2005 to 2015. Only published peer-reviewed original articles were considered for inclusion. In addition, studies were only considered for inclusion if they focused on dementia or Alzheimer's disease, examined care or service provision in relation to caregivers of persons with dementia or Alzheimer's disease in North America, and were relevant to rural or remote caregiving challenges. Excluded from review were dissertations, editorials, book chapters, book reviews, letters to editors, and commentaries. Only studies that involved informal or family care were included in this review.

One reviewer, DJD, extracted articles from each database for creation of the initial evidence based table for analysis and discussion with DP and SN. Extracted articles were verified by DP and SN and included details regarding the sample, methods, findings, definition of rural, caregivers of person with dementia, major findings, and study recommendations.

Findings

The database search resulted in 93 articles identified for review; 11 that were not from peer-reviewed original articles were removed. DP and SN each reviewed half (41) of the remaining 82 abstracts. After reviewing the abstracts, 51 did not meet the inclusion criteria and were excluded. The remaining 31 papers were reviewed by all three reviewers, and 19 papers were subsequently excluded because they did not meet the inclusion criteria.

Of the remaining 12 studies that met our inclusion criteria, only seven defined rural informal caregiving, and eight defined the four manifestations through the lens of

SUHB. The current review includes papers with a sample that was primarily informal or family caregivers and/or the study objectives related primarily to family or informal caregivers. Four themes were identified in eight studies included in this review are 1) access to healthcare, 2) unique rural needs, 3) application of knowledge, and 4) rural cultural competence.

Conceptual Framework

Rogers (1970) asserts that when one person interacts with another there is an integration of energy fields. There is a creative potential to experience patterns of life and human freedom to maximize caregivers of persons with dementia in rural communities in optimal health, well-being, and quality of life.

The purpose of this paper is to discuss the literature review that identified four manifestations for rural caregivers of persons with dementia: 1) access to health care, 2) unique rural needs, 3) application of knowledge, and 4) rural cultural competence. Using Rogers' SUHB conceptual framework principles of homeodynamics, which are resonancy, helicy, and integrality was the means to identify and synthesize the discovery of the four manifestations (Rogers, 1970, 1990, 1992). These three principles of homeodynamics convey the dynamic changes of rural living. Rural communities as mutual process of increasing diversity, creativity, and innovation support a potential for growth and transformation (Rogers, 1992).

While evidence on informal and family dementia care in rural communities is limited there were four pattern manifestations for providers to consider from the conducted literature review. The four manifestations discovered were: access to health care, unique rural needs, application of knowledge, and rural cultural

competence (Crow, Conger, & Knoki-Wilson, 2011; U. S. Department of Health and Human Services, 2011; Family Caregiver Alliance, 2015; Healthy People, 2015; IOM, 2015; Mason-Baughman & Kisiday, 2012; Orpin, Stirling, Hetherington, & Robinson, 2012; Sun, Kosberg, Kaufman, & Leeper, 2010).

Conducting the literature review grounded in SUHB was helpful in order to describe persons living in rural communities as a unique irreducible energy field integral with their environmental field.

Manifestations of an open and mutual human-environmental field allowed for discovery of human-environmental patterns of rural community members lifeworld. The goal is to minimize caregiver stress and burden by promoting health, well-being, and supporting self-transcendence for which serves as the developmental process of aging (Family Caregiver Alliance, 2015; Lander-McCarthy, Ling, Bowland, Hall & Connelly, 2015; Reed, 2014)

Aging and cognitive health are viewed as a mutual process which can be supported for the potential for a rewarding caregiving experience. Rather than caregiving perceived as burdensome, the possibilities of a fulfilling and improving quality of life are supported. The literature review revealed patterns that described these four manifestations as the irreducible and integral nature of rural caregivers of persons with dementia and their environment, and how nurses can promote health, support well-being, and enhance human betterment (Rogers, 1990). A discussion of the four manifestations follows.

Access to health care

Understanding access to health care begins with being aware of the issues of rural communities, and barriers and challenges to obtaining needed services and resources (Healthy People, 2015). Barriers

to access to healthcare for rural communities are due to the shortage of health care professionals, inadequate access for physical and mental health care coordination, and the information required to access health care (Forbes, et al., 2012; Klug, Muus, Volkov, Wagstrom-Halaas, 2012; Klug, Wagstrom-Halaas, Peterson, 2013; Jha, Seavy, Young, & Bonner, 2015). In addition, Klug, et al (2012) demonstrated how a state-funded dementia caregiver support program in rural North Dakota has made a positive impact on caregivers and reduced the potentially avoidable health care costs.

Having the resources of transportation, location and services of senior centers, and access to the Area Agency on Aging (AAA) provide access for those in rural communities. An underutilized resource is the AAA. Access to services and supportive care is available to caregivers, care recipients, and the rural community as a whole by partnering with the AAA.

Building on a successful model pioneered in the southeastern region of the U.S., Area Agencies on Aging (AAAs) were formally established in the 1973 Older Americans Act (OAA) as the “on-the-ground” organizations charged with helping vulnerable older adults live with independence and dignity in their homes and communities. There are 618 Area Agencies on Aging throughout the United States. (National Association of Area Agencies, 2015). Unfortunately, many rural communities are unaware of this beneficial service.

Unique rural needs

There is limited availability and insufficient services for dementia care in rural communities, especially as the disease progresses (Klug, et al., 2013). Many unmet needs such as bathing, dressing, housekeeping, and meal preparation along with transportation difficulties are unique to

rural communities as well as lack of resources compared to urban and suburban communities (Li, et al., 2011). Overall health of caregivers is poor as they struggle with obesity, decreased fruit and vegetable intake and numerous medical conditions are discovered directly related to caregiver burden (Castro, et al., 2007).

Assessing rural community needs is the responsibility of nurses, who are in a unique position to not only assess care recipients and caregivers needs, but also rural community available services and resource needs. According to Crow, Conger, and Knoki-Wilson (2011), rural nurses are generally newly graduated nurses that either live in the rural area or come to the rural area-to find work. Nurses coming into rural areas from urban settings are often culturally unfamiliar with the population they will be serving (Crow, et al., 2011). According to Crow et al. (2011), cultural dissonance was a huge factor in their adjustment to their new environment (Crow et al. 2011).

Healthcare needs require approaches that differ significantly from urban and suburban populations (Winters & Lee, 2010). Subcultural values, norms, and beliefs play key roles in how residents of rural communities define health and from whom they seek advice and care (Winters & Lee, 2010). A humanitarian conceptual model such as Rogers' theory, Science of Unitary Human Beings, can be used as a guide for information sharing, increase human being choices, with ultimately facilitating human betterment (Rogers, 1970, 1990, 1992).

These values and beliefs, combined with the realities of rural living, such as weather, distance, and isolation can markedly affect the practice of nursing in rural settings (Winters & Lee, 2010). By being aware of the unique circumstances affecting rural communities' nurses can respond with an individualized

psychoeducational program for caregivers of persons with dementia and rural community members and their environment. A psychoeducation intervention program that could include mindfulness practices such as reflection, deep breathing, appreciation of nature and rural environment, self-compassion, as well as spiritual/religious and creative activities of movement, dance, music, expression of self through writing poetry and journaling can prove beneficial. Klug, et al (2012) provided a successful program in rural North Dakota called Dementia Care Services Program (DCSP) that provided resources, care consultation, ease of burden, and empowered caregivers.

The DCSP is a useful model to promote the programs usefulness and guide in rural caregiver's decision making. In addition, preparing and planning for activities of daily living to allow for the potential of enhanced quality of life. The goal is to minimize caregiver stress and burden by promoting health, well-being, and supporting self-transcendence for which serves as the developmental process of aging (Family Caregiver Alliance, 2015; Lander-McCarthy, Ling, Bowland, Hall & Connelly, 2015; Reed, 2014)

After a comprehensive assessment is complete and a plan is created with the caregiver and care-recipient, the journey may be transformed from perceived burdensome to appreciation and a rewarding mutual experience of self-transcendence (Reed, 2014). Rural caregivers who assume primary responsibility for the health and well-being for a person with dementia should be considered a key member and partner, alongside the health care provider, rather than as an adjunct to formal health care (Orpin, Stirling, Hetherington, & Robinson, 2012).

By partnering with the nurse, rural caregivers at risk for stress, pattern of burden and coping strategies, pattern

manifestations can be experienced, identified, and transcendence realized (Reed, 2014; Rogers, 1990; Lander-McCarthy, et al., 2015). Nurses can help family caregivers to identify their potential experiences about caregiving and can help them reflect upon their coping strategies to find the possibility of harmonious balance within their situation.

Risk groups of caregiver's pattern manifestations can be identified as mutual process, especially for those with low perceived health and sense of coherence, for early interventions to reduce burden, and enhance positive coping strategies and processes (Andrén & Elmståhl, 2008).

Application of knowledge

Helping caregivers become knowledgeable about cognitive health and early signs of dementia with eliminating stigmatization can promote socialization and decrease isolation for caregivers, and can also reduce the burden of care (IOM, 2015). Nurses can provide psychoeducational workshops directed towards the knowledge needs of caregivers. Nurses also need to be aware of social services available within the rural community and communicate this information to caregivers.

A social support network of family and friends, community resources, religious groups, volunteers, and respite care can have a strongly positive effect on the mental, physical and emotional health of the rural dementia caregivers. Creating needed services unique to the rural communities is the role of the nurse.

Rural cultural competence

Rural cultural competence is essential in rural communities. Rural cultural competence knowledge can reduce health disparities especially when considering the connection between a culturally diverse nursing workforce and the ability to provide quality culturally competent patient care (AACN, 2013).

When nurses are culturally fluent in the health care needs of a rural community, they can guide caregivers in overcoming barriers to access, to health care and isolation (Mason-Baughman & Kisiday, 2012). Campinha-Bacote (2002) describes the seeking and experiencing of cultural encounters as developing cultural competence through awareness, sensitivity, knowledge, and desire by viewing it as an ongoing journey to include the totality of beliefs, values, and experiences that shape the uniqueness of human beings.

Older rural adults often seek care only when in crisis because of income constraints and limited access. Financial difficulties and transportation issues frequently prohibit follow-up visits as well. Awareness of demographics, health care status and access to health care, education, and health literacy, in a diverse rural population should guide nursing practice, education and research. Overall, nurses help people by supporting change in order to fulfill their potential, thereby, improve quality of life.

Conclusion

Nurses should be sensitive to the unique issues of rural elderly and nurture health literacy for establishing effective communication regardless of socioeconomic, educational, or ethnic background. Utilizing cultural self-awareness nurses should also question their own biases and attitudes toward persons with dementia and their caregivers, who may have different cultures from their own. Nurses can seek opportunities to enhance their cultural education, awareness and sensitivity. Further research is needed on how manifestation of rural caregiving is experienced, and educational knowledge and support needs of rural caregivers in order to address the health care issues that many

providers, caregivers and care recipients are currently experiencing.

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Spacetime Symmetry: Rogerian Encounters with Einstein

*We achieve a life worth living by understanding how the cosmos achieved an existence worth existing.*¹

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ABSTRACT

This paper is a celebration of Martha Rogers' conceptual ideas, specifically her translation of Einstein's theories of the cosmos into theoretical principles and perspectives for nursing. The paper presents an overview of Einstein's theories of relativity, with a focus on spacetime symmetry and its parallels to Roger's theoretical principles. The broken symmetry of temporality is explored in reference to ontological questions in nursing. Epistemic implications of Einstein's special relativity and the speed of light are addressed. The paper concludes with a theme of translating metaphysical concepts into empirical inquiry for nursing.

Key Words: Einstein, Rogers, spacetime, symmetry, temporality

The nature-philosophers of Greece, some of the world's first scientists, proposed explanations about observable events by speculating about unobservable processes and patterns (Maudlin, 2012). Similarly, scientists today study the empirical and posit theories based on an underlying order to the natural world. They attribute their successes to these patterns in nature. Scientists' theories about patterns in nature can shift our paradigms in unexpected ways. Einstein (1879-1955) did this with his theory of general relativity, which explained gravity not as a force but as a property of space and time. So did Martha Rogers (1914-1994) who, unlike any other nurse theorist then or since, used discoveries heralding the space age for thinking anew and more broadly about human beings and their environment. Rogers (1970, 1980) used her insights from physics along with knowledge from other sciences, the humanities, and philosophical sources in a conceptual system that distinguished nursing as an autonomous science and practice. Just as Einstein's work continues to frame and inspire physicists' work today, Rogers' theoretical contributions to nursing are still unfolding.

This paper is a celebration of Martha Rogers, specifically her translation of patterns of the cosmos into theoretical principles and perspectives for nursing. In doing this, I revisit some of Einstein's main theoretical ideas about spacetime and relate them to Rogers' conceptual system, ontological and epistemic issues, and to future inquiry in nursing science.

I begin with a reflection on shifts in paradigms and an overview of Einstein's theories of special and general relativity. Einstein's theme of spacetime symmetry is highlighted and then related broadly to nursing and health. Two dominant frameworks of time are discussed in reference to the concept of broken symmetry

in temporality, as it confronts nursing with metaphysical (ontological) questions – such as about life and death. Implications of Einstein's special relativity theory for nursing epistemology are also addressed – what we can come to know within the limits of spacetime. I also mention loop quantum gravity theory in reference to temporality. I conclude with reflections on Einsteinian and Rogerian theory and need for continuing inquiry based on the underlying pattern of the person-environment process of health and well-being.

Shifting Paradigms

Rogers' (1970) *Introduction to the Theoretical Basis of Nursing* initiated a major shift in our paradigm of inquiry and practice. She revised views about human beings, environment, and health to motivate a new perspective different from the traditional mechanistic, biomedical model of health to a unitary view of the human-environment process in health and healing. Her nonlinear, unitary view of holism challenged the existing additive paradigm of holism.

Einstein challenged a major paradigm, the Newtonian view of space and time. According to Newtonian theory, gravitational forces act on a flat three-dimensional space to produce acceleration of objects. Gravity was an absolute and immediate *force*. In contrast, Einstein theorized that gravity was not a force but a mass-induced curvature of space; it followed a curved four-dimensional structure or a *Minkowski spacetime manifold* of events that combined space and time (Friedman, 2007). The element of time was introduced by Einstein's professor and mathematician Hermann Minkowski who, after reading Einstein's early papers on his 1905 theory of special relativity, "revealed important symmetries in time and space" (Siegfried, 2002, pp. 77, 245). In Minkowski spacetime, time is a fourth coordinate (along

with the three dimensions of space) to describe a location in space. Einstein's 1915 theory of general relativity provided the explanation of how space and time were unified into *spacetime* by one of the most profound symmetries of nature – gravity. Because Einstein's explanation initially derived from unobservable patterns and mathematical equations, he preferred calling this *theory* of gravity an *invention*. Since then, of course, his invention has acquired the empirical support to regard it a theory if not a law.

The Bucket Experiment and Shifting Spacetime Perspectives

Isaac Newton's 1689 Bucket Experiment illustrates shifts in thinking about the universe over the centuries (Dainton, 2010). For the experiment, imagine a bucket filled with water suspended from a tightly wound rope. Release the rope and the bucket spins. At first only the bucket spins and the water surface remains flat. Then, the water spins and its surface becomes concave as its center is drawn down into the bucket. The water continues to spin for a while, even when the bucket stops spinning. Newton used this experiment in part to argue that the physical effect (the concavity of the water) of the water's rotation occurred not in relation to the objects nearby, but in relation to an absolute space.

Three centuries after Newton conducted this experiment, physicists still debate over possible explanations of the underlying process that bends the water (Greene, 2004). **Newton** proposed an *absolutist* view of space: He depicted space as an absolute entity that presses against the water and alters its shape (Maudlin, 2012). Then in the 1800s, the Austrian physicist and philosopher **Ernst Mach** employed a *relationalist* view of space to explain the water's spin as caused by its relationship to

the matter and objects in space, although he did not offer an explanation as to exactly *how* the far away objects in space could influence the water. Inspired by Mach's relationalist view, **Einstein** (1936, 1949) thought that gravity might have a role in how spatial objects influence the water, and that Newton had "mistaken the gravitational field for an absolute space" (Rovelli, 2004, p. 56). Einstein rejected Newton's view that gravitational effects occurred *instantaneously*. The infinite velocity of gravity as required by Newton's view conflicted with Einstein's 1905 discovery of *special relativity* where nothing could exceed the speed of light.

Special Relativity. Einstein's 1905 theory of *special relativity* was built on two principles: 1. The fixed velocity of the speed of light at 186,000 miles per hour (independent of the motion of the source of the light and speed of the observers); and 2. The relativity principle (today it's called a symmetry law) that explains why observers moving at uniform (non-accelerating) speeds do not discern movement. This is so because the laws in two reference frames of constant speed have symmetry; they remain the same for both observers. Einstein's "great insight" was that these two principles worked together (Greene, 2004) to make it the case that there is no objective point in space for deciding *when* an event occurs; this depends upon the motion of the observer.

General Relativity. After a decade of intense mathematical and theoretical work, including pondering the bucket experiment, in 1915 Einstein proposed his theory of *general relativity* (Gribanov, 1987). This theory was "general" in that it applied to all frames of movement, accelerated as well as inertial (uniform), based on that deep symmetry of nature, *gravity*. The force felt

from gravity is the same force that occurs in accelerated motion (as with the unwinding rope). Einstein posited that gravity was a mass-induced curvature of spacetime; the larger the mass, the greater the curvature and gravitational “pull” of objects toward the center of that mass. Objects fall toward the center of a mass along curved spacetime. (Einstein’s invention of general relativity was facilitated by 19th century mathematician Bernard Riemann who described a geometry of curved surfaces, unlike Euclidean geometry where parallel lines never crossed.) The spinning rope exerted a “localized” gravitational force, which bent the water toward the center of the bucket. So today, whether scholars subscribe to the relationalist or absolutist view of spacetime, they acknowledge that *symmetries* of nature are foundational in Einstein’s relativity theories.

Symmetry and Health

To sum up, then, Einstein’s (1936, 1949) theories employed laws of symmetry in nature. Einstein’s 1905 theory of special relativity describes a symmetry between two objects in *inertial* (non-accelerating) frames rendering a person unable to discern which object is moving, such as when riding on the subway and seeing the people on the platform “pass by.” Einstein’s 1915 theory of general relativity describes a symmetry between objects in an *accelerated* frame under the influence of the gravitational field as in a free fall or orbit. In free fall, one is a “co-mover with gravity,” moving along the curvature of space, unable to discern whether one is accelerating through spacetime or spacetime is accelerating as gravity through the person (Gowan, 2014).

There is a parallel notion of symmetry between Einstein’s principle of *relativity* and Rogers’ principle of *integrality*:

- Within **Einstein’s** 1915 theory, there is an unavoidable *relativity* in how observers are connected to their environment such that space and time are no longer viewed as distinct entities but instead as *spacetime*. Travel by the laws of symmetry, when one is a co-mover with the gravitational field as in free fall or orbit, is smooth and the force of gravity is undetectable --undetectable that is until a thrust of acceleration (change in velocity) breaks the symmetry of gravity, where the free fall ends and can change the direction of movement. On a more local level, for example, a person can break the symmetry of special relativity by sticking her arm outside the window of a moving car and becoming acutely aware of motion through space.
- Within **Rogers’** (1990, 1992) theory, there is an unavoidable *integrality* in how human beings are connected to their environment in health patterning such that this became her *person-environment process*. There is a symmetry between person and environment whereby we’re hardly aware of being in health and in process with our environment – until the pattern is perturbed in some way. This new pattern, then, may be

experienced as illness or disability.

Broken Symmetries as Areas of Inquiry

Physicists study broken symmetries as a way to discover symmetry (Siegfried, 2002). Many symmetries in nature are hidden from us, so we are often more familiar with broken symmetries. For example, magnets have a symmetry where initially its particles are randomly oriented. Heating the magnet breaks this symmetry, and when cooled, the particles within the magnet become oriented familiarly in one direction. A steam cloud loses its symmetry when it cools and turns into water and then ice particles. It is thought that the four forces in the Standard Model of the universe (strong and weak nuclear forces, electromagnetism, and gravity) were once united but emerged out of the broken symmetry that occurred as the universe began cooling after the Big Bang (Siegfried, 2002).

Broken symmetry may be a path to discovering healthful processes. In the human sciences, our approach to knowledge typically has been to first acquire understanding of the normal, for example in physiological or emotional development, before studying the abnormal and pathological. But perhaps another approach to understanding health and well-being (nursing symmetries) is by studying “broken” symmetries as encountered in nursing practice and theories. Symmetry in the person-environment process of health, when broken, may generate palpable health problems and acute experiences of illness. Nurses are equipped to both study and address these broken symmetries, or asymmetries in human beings.

The Asymmetry of Temporality and Nursing Ontology

Although we live under nature’s laws of symmetry, gravity in particular, our lives are also influenced by broken symmetries. A major asymmetry in life – and one that nurses and other scientist have studied – derives from a broken symmetry where space and time have become disconnected. This is the experience of time or temporality (Dainton, 2010; Siegfried, 2002).

Within this temporal perspective, we perceive time as unlike space. We don’t talk about space *passing*, or the march of space, or the flow of space in the way we talk about time – time passing, time marches on, the flow of time, the directionality of time. There is an arrow of time that pierces through our lives such that what is future will become present, what is present will become past, and what is past was once present. However, this classical view of time is inconsistent with Einstein’s relativity theory, where there is no stable or unique present existing in the *now* in a three-dimensional space with a distinct past and future (Brading, 2015; Dainton, 2010).

This perception of the flow of time and time passage is attributed to a broken symmetry that some physicists posit to have occurred because of certain initial conditions of the universe as it cooled. Just how a temporally *asymmetric* world has emerged from time-symmetric laws of nature is a very old and still unsolved puzzle. We perceive various asymmetries (Dainton, 2010):

- *Entropic asymmetry* - According to the second law of thermodynamics, disorder increases over time in closed systems.
- *Explanatory asymmetry* - We tend to explain later events by earlier events, and not the reverse.
- *Knowledge asymmetry* - We have detailed and reliable knowledge of what happened in the past, more so

than of what will happen in the future.

- *Action asymmetry* - We deliberate and worry over what to do tomorrow, not what to do yesterday (though we often worry about what we did yesterday!)
- *Experience asymmetry* - We experience our lives unfolding in a present that seems to move forward toward the future. We “remember” the past but not the future.

Now, it may seem ridiculous to point out these asymmetries to those of us accustomed to living by a perception where time flows from a past, to a present, and on to a future. But from another temporal framework based on spacetime symmetry where space and time are *not* disconnected, the asymmetries listed above are puzzling.

Two Frameworks of Time

There are two common frameworks about time passage, originating from philosopher J.M.E. McTaggart in 1908 but perhaps even further back to 4th century BCE (Dainton, 2010). The **A-Series framework** posits a dynamic view where time appears to run from a distant past up to the present and on into the future. In this framework, things seem to come and go, and events hold properties of pastness, presentness, or futurity. The present, whether or not it is relativized to a certain inertial frame, is privileged as having concrete reality. However, McTaggart claimed that the A-view cannot exist because paradoxically at any given time, since everything starts off as being future, it follows that an event must be past, present and future all at once as it moves through time.

The **B-Series framework**, more commonly called the *Block view* of the universe and the one most subscribed to by scholars (Brading, 2015), posits that there is

no actual passage of time; instead all events already exist all at once, in a Minkowski manifold of spacetime. The spacetime symmetry postulated in Einstein’s theory of special relativity is reflected in the Block framework of time (Dainton, 2010). Time is like space: It does not flow, it just *is*. *Now* and *then* exist all at once, as much as *here* and *there* exist at the same time.

The B-series is often depicted as a rectangular block where all events in time exist at once. There is no specific past, present, future and events are merely earlier or later than each other. The block (as the universe) doesn’t exist *in* time but rather time exists within the block. All moments in time are equally real. There is no moving or changing present (Dainton, 2010, p. 7; Davies, 2014) according to some primal or fundamental “time” external to our world through which we move for our past, present and future.

Contemporary philosopher of physics, Carlo Rovelli, further describes a view about time (and space) according to “loop quantum gravity” theory, which brings together ideas from general relativity theory and quantum mechanics. According to this theory, neither time nor space is absolute and continuous: “There is no longer space that ‘contains’ the world, and there is no longer time ‘in which’ events occur... The passage of time is ...born in the world itself in the relationship between quantum events that comprise the world and are themselves the source of time” (Rovelli, 2016, p. 44). Further, laws once thought to be fundamental may actually undergo evolution (!) in a universe whose fate is not equilibrium but self-organization (Smolin, 2013). In words we can imagine Rogers to have uttered, Rovelli (2016) states: “At the minute scale of the grains of space, the dance of nature does not take place to the rhythm of the baton of a single orchestral conductor, at a single tempo: every process

dances independently [--and unpredictably!--] with its neighbors, to its own rhythm” (p. 44). Our temporal perspectives, then, may emerge out of our many interactions and *integrality* with the environment, out of Rogers’ (1980) *person-environment process* or Rovelli’s (2016) “elementary processes wherein quanta of space and matter continually interact with one another” (p. 44).

Einstein remained puzzled about the distinction between theoretical understandings of time and the everyday experience of time, but he generally rejected distinctions between past, present, and future. His most descriptive testimony to this view is found in an often-quoted letter he wrote to the family of a very close friend, Michele Besso, who had just died. In the letter, Einstein wrote “*And now he has preceded me briefly in bidding farewell to this strange world. This signifies nothing. For us believing physicists, the distinction between past, present and future is only an illusion, even if a stubborn one*” (cited in Dainton, 2010, p. 408, quoted in Hoffman, 1972, p. 257-258.). Einstein died soon after this.

Rogers likely expressed similar views about death similar to those of Einstein. I say “likely” because as a doctoral student, I can only recall my fellow Rogerians remarking that Rogers’ view of *death as an illusion* was so fervent that she refused to use the word, death. The idea was that the connotation of death as a final end to the human energy field deeply conflicted with her ontological view of unitary human beings and misrepresented reality. Whether or not Rogers ever actually expressed these ideas, it seems consistent with her philosophy and cosmology of nursing, as drawn from “Einstein’s ideas about relativity and the unity of spacetime as a foundation for her postulate of pandimensionality” (Butcher, 2015).

Other scholars have expressed ontological perspectives similar to those of Rogers. Theoretical physicist Davies (2014) suggested that if we could explain away the flow of time, we would have fewer significant worries: Worries about death would become as rare as worries about one’s birth; there would be less urgency about time; expectation and nostalgia would not be so prevalent; and we would no longer fret about the future or grieve for the past (p. 13).

Why do we experience these asymmetries when the laws of our physical universe are symmetrical? We were able to shift our pre-Copernican views of the solar system, but not so with our pre-Einsteinian views of space and time. This question continues to be a puzzle for physicists and philosophers alike. Some physicists and philosophers of physical science have even suggested that our laws are not so timeless or absolute, that “laws of nature evolve in time” (Smolin, 2013, p. 249). Regardless of this ongoing puzzle, it is likely that our asymmetrical temporal experiences are relevantly linked to health and well-being. Temporal experience has been a concept of interest to nurses and other scientists such as psychologists, as well as poets and musicians.

Historically, Rogerian nurses have studied human interactions with time and space as related to health (for example see Malinski, 1986). Time asymmetries are vividly experienced in various ways relevant to nursing, for example, while waiting -- for a diagnosis, for pain medication, for a communication or a visit; or when ambulation is altered, on bedrest; in reminiscence; and across the lifespan from youth to growing older and in dying. We’re all familiar with the unhealthful time pressure and narrowed time perspectives that accompany crises. Alternatively, there is the rejuvenating sense of timelessness that

characterizes vacations or being engrossed in a valued activity – where spacetime symmetry is unbroken and our “travel through space” is smooth. Still, something in our person-environment process breaks spacetime symmetry in a way that alters our awareness of ourselves and our environment. Rogerian nurses possess the conceptual and empirical tools for inquiry into these health-relevant experiences of our movement through spacetime.

The Cosmic Speed Limit and Nursing Epistemology

The speed of light, as postulated in Einstein’s theory of special relativity, has epistemic implications. What we can know about life and death, and our universe is limited by the speed of light, our “cosmic speed limit” (Greene, 2004). In a sense, history moves at the speed of light (Norton, 2015). The symmetry of gravity converts space to time (Gowan, 2014) such that the combined speeds of movement through space and movement through time never exceed the speed of light. As speed through space increases, time dilation occurs and slows time to where, theoretically, at the speed of light, time stops. So, spacetime symmetry enforces a cosmic speed limit on what is knowable and observable about ourselves and the universe.

Philosophers of physics use a *light cone* as a visual aid for understanding this cosmic speed limit and the trajectory of events that are knowable, as they propagate outward in waves through the geometry of spacetime. As light travels, it follows the curvature of spacetime and “lights up” the geometric structure of spacetime. Spacetime has a cone-like structure even in the dark. Every event in spacetime has a light cone. When a pulse of light is emitted (that is, when an event occurs) at a particular point, the light spreads in sphere-like circles like ripples on a pond. The expanding sphere of

light marks out a cone-shaped area. The region within the cone represents the set of events traveling at or below the speed of light that we can know or influence. The region beyond our light cone is called the “elsewhere” (Norton, 2015).

Spacetime is filled with light cones, each of which mark all of what can be known about that event as information is received at or under the speed of light. However, despite this cosmic speed limit on what we can know, we can *imagine* the existence of events (for example the death of a star or the birth of a planet and other events) outside the light cone. Although reality is never entirely observable at any given point in time, we can contemplate the elsewhere and form metaphysical beliefs about the unseen. Those who theorize about the unobservable – like Rogers and Einstein – provide a window into future possibilities. While there is a limit on our epistemology (as a science), we also have an ontology and metaphysical views (as a philosophy), all of which keep us open to discovering new knowledge and nursing practices (as a basic and professional discipline).

Conclusions: From Metaphysical Questions to Empirical Inquiry

By appreciating the limits and possibilities posed by spacetime symmetry, we come to value our theories and philosophies as placeholders of conceptual inventions waiting for empirical exploration. Physicist Sachs (2010) stated that the revolutionary idea in Einstein’s theory of general relativity was that it provided us with a “spacetime language system that represents the mutual interaction of all of matter in the universe” (p. 73). Although physicists often speak in a mathematical language, Rogers (1992) recognized the relevance of spacetime for nursing in terms of the person-environment process characterized by openness, pattern, and

pandimensionality. This metaphysical language can be translated for future empirical inquiry.

Einstein's (1936, 1949) concept of spacetime motivates metaphysical questions for nurses, notably through the lens of Rogers' (1990) science of unitary human beings. The nature of nursing is such that it must wrestle with questions about life and death, the nature of human beings and health, meaning and purpose in life. As nurses, we employ both metaphysical as well as the empirical systems of knowledge and belief in our work with patients and families. Rogers' science of unitary human beings helps us make meaningful links between the cosmos and our personal lives and professional work. She is admired and beloved for this.

Rogers' (1970) insights stretched our imaginations toward new ways of thinking about human beings, environment, health and nursing practice. Nature's laws of symmetry, embedded in Einstein's theories, are congruent with Rogers' deepest insights about human beings in relation to the cosmos, as she wrote about the "infinite field or manifold" and about the pandimensionality (of human beings) as a "non-linear domain without spatial or temporal attributes" (Rogers, 1992, p. 29). In stating this, Rogers was challenging us to imagine reality beyond the asymmetries in conventional thought, to account for the underlying pattern so relevant to human health and well-being, and to advance a new paradigm of nursing.

Looking ahead, Einstein's general theory of relativity is a theory of symmetry where moving through space means moving through time; gravity is the way matter distorts spacetime. But as Siegfried (2002) explains, general relativity is a classical theory that is not based upon quantum features of the atom. So, it is conceivable that the quantum particle may extend ideas

about the 'field' as fundamental. More recently, theoretical physicists have proposed loop quantum gravity theory (LQG). Unlike the standard model, LQG theory brings together quantum mechanics and general relativity – the very small and the very big -- in new understandings of the evolving universe and spacetime. And what is it but *time* that "sits at the center of the tangle of problems raised by the intersection of gravity, quantum mechanics, and thermodynamics" (Rovelli, 2016, p. 63)! Physicists expect to find other dimensions far beyond the standard spacetime dimensions we experience – maybe reaching pandimensionality. Rogerian nurses will be ready.

¹ from Newberger Goldstein, R. (2014). *Plato at the Googleplex: Why philosophy won't go away*. New York: Pantheon Books. The author is explaining the Greek ethical concept of arête, where the "impersonally sublime is internalized into personal virtue" (p. 393).

² See Smolin (2013) and Rovelli (2003) for two highly readable sources on this theory competing with string theory about quantum gravity, and in a manner strikingly consistent with Rogerian views about open systems and ongoing change.

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