Context and Research Use in the Care of Children: A Pilot Study
Project 2 CIHR Team in Children's Pain

Technical Report

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EXECUTIVE SUMMARY

In recent years, there has been tremendous growth in pain research especially related to pain in children. However, these research findings are not well translated in the clinical setting. The CIHR Team in Children's Pain Grant has an overarching goal of understanding how to make changes in treatment of pain in children that will facilitate adoption of research at the bedside, ultimately leading to minimized acute pain in children and a decrease in needless suffering. In order to plan interventions to improve health outcomes by using research findings, it is necessary to understand the context within which one is trying to effect change. The focus of Project 2 of the CIHR Team Grant in Children's Pain is an assessment of the organizational context of each participating hospital unit and its influence on knowledge use and pain outcomes.

This document is the final report of a pilot study for Project 2 of the CIHR Team Grant in Children's Pain (CTP-79854). The primary purpose of the study was to pilot the Alberta Context Tool (ACT), a survey instrument which measures organizational context and the research utilization behaviors of health care professionals, in a pediatric environment. The Alberta Context Tool © (Carole A. Estabrooks, 2007) was developed, tested and validated for five professional groups in acute care settings[a] and has proven to be a reliable means of assessing the characteristics of organizational context that are modifiable and amenable to change.

Three major outcomes of the pilot study have been used to inform critical aspects of the main Project 2 study.
1. The Alberta Context Tool survey instrument has been successfully modified for use in pediatric settings.
2. The web-based data collection format was found to be highly effective in the pediatric environment relative to previous studies where mixed mode (web and paper) survey options have been available.
3. The face-to-face distribution of survey packages and introduction of the study combined with an innovative incentive process contributed to an overall response rate of 66% for this study. Adaptations of this recruitment and incentive process will be used where possible for the main Project 2 study.

Key findings from the analysis of the pilot study data include:

- Three dimensions (culture, leadership and evaluation) of the modifiable elements of context explained 62% of the variability in reported context by the 5 professional groups.

- A statistically significant difference between the three units was observed in 6 of the 8 context dimensions of ACT (culture, leadership, evaluation, organizational slack, information sharing social processes as well as structural and electronic resources).

- Statistically significant differences by hospital unit were also noted in the dependent research utilization variables, instrumental and conceptual research utilization.

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[a] Estabrooks, C.A., Squires, J.E., Adachi, A. M., Kong, L., Norton, P.G. (2008). Utilization of Health Research in Acute Care Settings in Alberta Technical Report. (Report No. 08-01-TR). Edmonton, AB, Faculty of Nursing, University of Alberta. (ISBN: 978-1-55195-231-4).

- Statistically significant differences in scores for all eight hypothesized dimensions of context between the five professional groups were evident. Managers received the highest scores for culture, evaluation and information sharing interactions. Allied providers received the highest scores for the leadership and organizational slack dimensions. Clinical specialists received the highest score for information sharing social processes and structural and electronic resources. Physicians and clinical specialists scored equally highest for information sharing activities.

Participants perceptions of organizational context were strongly associated with research utilization and varied among groups. This corroborates the findings from the previous study[b] using the Alberta Context Tool.

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[b] Ibid.

1.0 INTRODUCTION

The CIHR Team Grant in Children's Pain is a five year, multi-site study with a primary goal to decrease acute pain in hospitalized children by narrowing the gap between clinical practice and the research supporting optimal patient care. The research method was designed to link research utilization to patient outcomes using a robust theoretical model that integrates quality of research evidence with the context of care and facilitation approaches of translating research into practice.

In brief, the team grant is divided into three separate but related projects. Project 1 led by Bonnie Stevens focuses on establishing a Canadian Pediatric Pain Research Network Database modeled after Shoo Lee's Canadian Neonatal Network Database. This database, establishing a record of the management of painful experiences in hospitalized children across Canada, will provide a baseline for assessment of outcomes in projects 2 and 3. Projects 2 and 3 are focused on delineating the context of pediatric acute care units and assessing its influence on research utilization and pain outcomes. Project 2, led by Carole Estabrooks, will use the Alberta Context Tool (ACT) [© Carole A. Estabrooks 2007] to assess the influence of organizational context on research utilization. Project 3, also led by Bonnie Stevens, is a prospective cohort study with repeated measures will compare an interactive facilitation treatment intervention to usual care for translating pediatric pain research into practice. The integration of these three projects will allow the team to develop an in-depth understanding of the influence of context on research use and on acute pain management in hospitalized children.

This technical report summarizes the findings from *Context and Research Use in the Care of Children: A Pilot Study* for Project 2 conducted on three units in the Capital Health Region in Edmonton prior to initiation of the main multi-site Project 2 study in June of 2008.

Objectives
1. To test the ACT, previously developed and tested in adult acute care settings, in a pediatric setting
2. To conduct a concurrent process evaluation to assess the acceptability and feasibility of the data collection methods proposed for the multi-site Project 2
3. To assess the stability of the instrument factor structure in pediatric acute care
4. To inform any needed modifications to the ACT survey for pediatric acute care settings
5. To create a profile of context and research utilization in each of the three units

Findings from this pilot study have since been used to inform the main Project 2 Study, conducted in 32 units at 8 sites across Canada (May 6 - June 30, 2008).

2.0 SURVEY DEVELOPMENT AND REFINEMENT

2.1 Overview ACT

The Alberta Context Tool (ACT) was developed by Estabrooks et al.[c] in 2005 for use in a study titled *Utilization of Research in Acute Care Settings in Alberta*. The instrument was designed to assess the influence of organizational factors on research utilization in various health care professional groups. The Promoting Action on Research Implementation in Health Services (PARiHS)[d] framework provided the theoretical foundation for the instrument development and a review of relevant literature aided in defining and operationalizing the elements of the survey. For further details on the development, refinement and validation of the Alberta Context Tool please see the AKUTE Technical Report.[e]

Within the ACT, there are eight hypothesized dimensions of context:
1. Leadership
2. Culture
3. Evaluation
4. Organizational Slack
5. Structural and electronic resources
6. Information sharing interactions
7. Information sharing activities
8. Information sharing social processes (social capital)

The first 3 of these dimensions derive directly from the PARiHS framework. Each dimension has its own scale or set of items within the tool. Items assessing non-contextual concepts (e.g., research utilization) and staff burnout (measured using the Maslach Burnout Inventory - General Survey (MBI-GS) short form) were appended to the ACT for the AKUTE study. A diagrammatic representation of the ACT can be seen in Figure 1.

In the AKUTE study the instrument was piloted in five professional groups (nurses, physicians, managers, clinical specialists and allied health care providers) working in four acute care teaching hospitals in large urban settings in Alberta from October 2006 - January 2007. All data collection for the physicians, managers and clinical specialists was done using a web-based format of the survey, while nurses and allied health care providers were given a choice between paper-based and web-based formats. A total of 1058 health care professionals were sampled and an overall response rate of 43% was achieved.

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[c] *Utilization of Health Research in Acute Care Settings in Alberta.* (2005-2007). Estabrooks, C., Norton, P., Cummings, G., Newton, M., Birdsell, J., Trimbee, A., Leahy, M., Eagle, C. Alberta Heritage Foundation for Medical Research (AHFMR).

[d] Kitson, A., Harvey, G., & Mc Cormack, B. (1998). Enabling the implementation of evidence based practice: A conceptual framework. *Quality in Health Care*, 7, 149-158.

[e] Estabrooks, C.A., Squires, J.E., Adachi, A. M., Kong, L., Norton, P.G. (2008). Utilization of Health Research in Acute Care Settings in Alberta Technical Report. (Report No. 08-01-TR). Edmonton, AB, Faculty of Nursing, University of Alberta. (ISBN: 978-1-55195-231-4)

Figure 1. The Alberta Context Tool (ACT)*
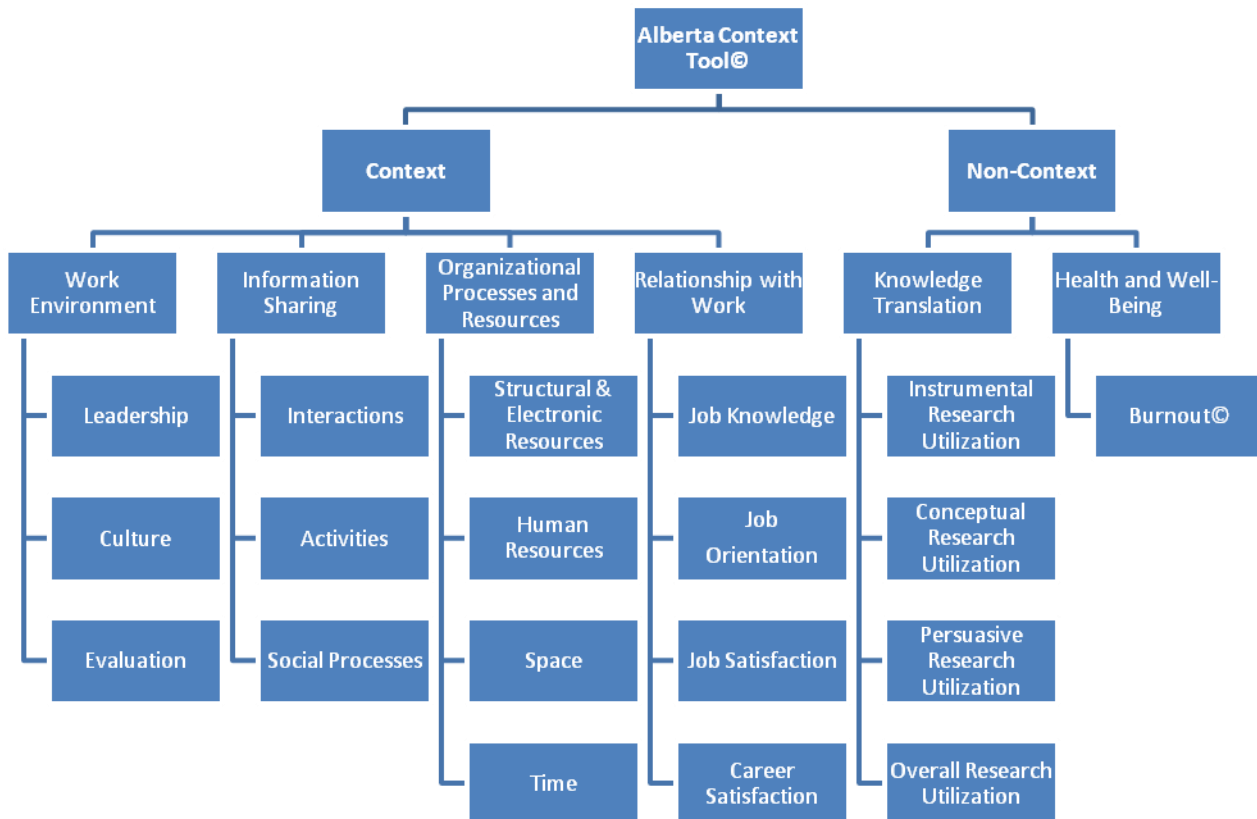
2.2 Modifications to ACT for the Pediatric Settings

One of the primary purposes for conducting the pilot study was to test the ACT in a population of neonatal and pediatric healthcare professionals in Edmonton in preparation for Project 2 of the CIHR Team Grant in Children's Pain to be conducted in 32 units at eight hospital sites across Canada. As the ACT was developed and previously piloted in adult acute care settings, several modifications were initiated to facilitate setting appropriate instrument for pediatric health professionals. Modifications included:

1. Language – wording was designed to be more reflective of pediatric settings (*e.g., the word "patient" changed to "patients and families"*).
2. The examples, which preceded the questions, were revised to relate to *pain in children* and the pediatric work environment.
3. Questions in the AKUTE study, which resulted in a greater than expected number of missing cases, were removed or revised for this pilot.
4. Two additional scales, the SF-8™ and the Environmental Complexity Scale (ECS), and a process evaluation section were added to the survey instrument.

Table 1 outlines the concept structure for the pediatric version of the ACT.

One of the goals of the pilot study was to assess the feasibility of administering web-based surveys only (i.e., with no paper option) in the pediatric nurse population.

Table 1. Concept Structure Pediatric Version of the Alberta Context Tool (ACT)

Overall Concepts	Concepts reflected in Items	# of items	Sample item	Scale
Leadership	Openness, optimism, self control, empathic, developing others, conflict management	6	Calmly handles stressful situations	5-point Likert scale (strongly disagree to strongly agree)
Culture	Recognition, autonomy, work life balance, development opportunity, focus on service/mission, support	5	My organization effectively balances best practice and productivity	5-point Likert scale (strongly disagree to strongly agree)
Evaluation	Data access, informal data review, formal data review, action planning, performance monitoring, benchmarking.	6	Our team routinely monitors our performance with respect to the action plans	5-point Likert scale (strongly disagree to strongly agree)
Organizational Processes and Resources	Structural Resources	8	How often do you use/attend the following? - A Library -The internet	(Scales Vary): Structural and Electronic resources scored on a 5-point Likert frequency scale (Never to very frequently with a "non accessible " option)
	Electronic resources	3		
	Organizational support	3		Organizational support scored dichotomously
Organizational Slack	Human Resources	4	...enough staff to deliver quality care	Human: 5-point Likert scale (strongly disagree to strongly agree)
	Time	4	Time to do something extra for patients	Time: 5-point frequency scale (never to very frequently)
	Space	4	Space to provide care, discuss information	Space: 5-point frequency scale (never to very frequently);
Information Sharing Interactions	Interactions with direct and non-direct care providers, within one's own profession and outside	7-9	How often do you interact with people in the following roles or positions? - Someone who *champions* research and its	5-point frequency scale (never to very frequently)

Overall Concepts	Concepts reflected in Items	# of items	Sample item	Scale
Information Sharing Social Processes (Social Capital)	Bonding, bridging and linking – the active connections among people	6	use in practice People in the group share information with others in the group	5-point Likert scale (strongly disagree to strongly agree)
Information Sharing Activities	Engagement in formal and informal organizational activities,	5	How often do these activities occur? -Team meetings	5-point frequency scale (never to very frequently)
Relationship with Work • Job Satisfaction	Job satisfaction, career satisfaction, adequate knowledge for job and adequate orientation for job	4	Job Satisfaction: Overall, I am satisfied with my present job.	5-point Likert scale (strongly disagree to strongly agree)
• Career Satisfaction			I am satisfied with my career	
• Adequate knowledge			I have adequate knowledge for my present job	
• Adequate Orientation			I had adequate orientation	
Health/Well-Being • Burnout	Burnout refers to a debilitating psychological condition brought about by unrelieved work stress (Maslach, 1982)	9	I feel tired when I get up in the morning and have to face another day on the job	7-point frequency scale (never to daily)
Health Status	Physical function, physical role, bodily pain, general health, vitality, social function, emotional role, mental health (SF-8 Quality Metric inc.)	8	How much bodily pain did you have during the past week?	A variety of Likert frequency scales
• ECS	Impact of immediate work environment on the work that nurses do in caring for patients	23		Workload increase or decrease on a scale of 1(a little - 5 a lot)
Research Use (Dependent Variable)	The application of research findings to clinical practice. There are four types of research utilization: instrumental, conceptual, persuasive, and overall.	4	On your LAST typical workday how often, did you use research in this way?	5-point scale (10% or less to almost 100%)

3.0 FIELD TESTING

3.1 Ethical approval

The CIHR Team in Children's Pain pilot study received approval from the following Alberta bodies:
- University of Alberta Health Research Ethics Board (HREB)
- Operational and Administrative Approval: The Northern Alberta Clinical Trials and Research Center (NACTRC), Capital Health, Edmonton
- Additional approvals from Research Committees at the unit level

3.2 Pilot-testing of the ACT

3.2.1 Setting

Participants were recruited from one neonatal and two pediatric units in the Edmonton Capital Health Region. These units were purposively selected because the research team believed they were representative of the units being used in the larger study.

3.2.2 Sample

Five health care professional groups: nurses (graduate nurses, registered nurses and licensed practical nurses), physicians, managers, clinical specialists and allied health care professionals, were invited to participate in the pilot study. The three units selected provided 544 eligible participants in total. A census/convenience approach to sampling was used as this was a pilot study and the sample population was relatively small. The inclusion and exclusion criteria for the various professional groups are summarized in Table 2 and the number of available professionals in each unit is summarized in Table 3.

3.2.3 Recruitment

A modified Dillman (2007) approach was used for the recruitment and data collection process. Following selection of the units and four months prior to commencement of data collection, members of the CIHR Team in Children's Pain (one part-time study nurse and a graduate student) initiated what proved to be a highly effective recruitment procedure. A Patient Care Manager on each of the three units was consulted and asked to assist in the identification of key informants for each professional group. Based on their recommendations, introduction of the study to participants was conducted through a combination of formal (e.g., learn at lunch presentations) and informal means (e.g., one-on-one conversations). In total, 36 meetings across the three units were held to explain the study and its purpose. The study nurse and graduate student, sometimes assisted by the site investigator, attended meetings, rounds, education days or other forums to introduce the study to groups of individuals. These meetings addressed how, using the internet, the surveys could be accessed and completed. The meetings also provided an opportunity to scope the availability of computers, internet and email access, and the best approaches to recruit nurses to the study. As a result, face-to-face interaction and electronic and printed materials were used to increase the profile of the study. Face-to-face communication with individual staff members was employed where possible. Because it was not possible for the study personnel to meet individually with every nurse, dissemination of electronic and printed materials was used to complement the face-to-face interactions. Such materials contained responses to frequently asked questions regarding the study and completion of the survey. These materials were sent, electronically, to the unit managers for forwarding to staff using the internal

e-mail system. Additionally, printed copies were distributed at staff meetings, and posted in mailboxes and on notice-boards in staff common areas. In one unit, a description of the study was published in the staff newsletter. To increase the profile of the study and to promote information about the response rates, a colorful poster illustrating, graphically, the status of response rates was posted on a weekly basis in each of the units. Small tokens of appreciation in the form of boxed candy, donuts, muffins and ice-cream bars were provided to staff when they attended a meeting to discuss the study or when they discussed the study, in the clinical area, with one of the study personnel.

Personalized survey packages containing an information letter about the study, a business card providing a Uniform Resource Locator (URL) and a unique password, information on how to complete the survey on-line, a continuing education certificate signed by the Senior Operating Officer and the Principal Investigator and a $5 gift certificate for Tim Horton's were packed in sealed envelopes at the Population Research Laboratory (PRL), University of Alberta. These survey packages were hand delivered by the study nurse and the graduate student to each individual that met the inclusion criteria for the study on all three units. For individuals who could not be contacted, a copy of their survey package was placed in their mailbox. Two weeks following distribution of the survey packages reminder notification was sent to all participants. This took the form of a reminder postcard which was placed in the mailbox of individual nurses who had not yet commenced or completed the survey. Two weeks following the first reminder, a second reminder was distributed to all participants. This reminder was combined with a paper survey for the nurse participant group only.

Data collection took place from July to September, 2007. Throughout the course of the survey package and reminder distribution, various incentives and tokens of appreciation were delivered to the units with the "Compliments of the CIHR Team in Children's Pain" sticker clearly visible. During the data collection phase the study personnel also collected data from staff regarding use of the web-based survey. In particular, information about ease of use, difficulties encountered and recommendations to improve survey delivery was elicited. Study personnel specifically sought information from nurses who had not completed the survey in order to assess whether the web-based mode of delivery was a disincentive. This aspect of the process evaluation was designed to inform the researchers about the feasibility and acceptability of using a web-based survey in this population.

Table 2. Inclusion and Exclusion Criteria by Professional Group

Professional Group	Inclusion Criteria	Exclusion Criteria
Nurses	Graduate Nurses, Registered Nurses (RNs) and Licensed Practical Nurses (LPNs) in permanent positions (part-time/ full-time) on each of the three units involved in the study Casual nurses identified by the unit managers All staff must have worked on the unit for at least 6 months	Nursing/pediatric aides Clinical trial nurses Nursing students LPN Students
Allied Providers	Pharmacists (clinical) Respiratory therapists Rehabilitation therapists(occupational therapists and physiotherapists)	Non-professional Allied Providers (e.g., respiratory aide) Students of all allied provider groups

	Social Workers Dieticians Child Life Specialists Speech Language Pathologists All staff must have worked on the unit for a minimum of 6 months Must be identified by the unit managers	
Physicians	*In ICU Settings* Appointment to Department of Pediatrics with admitting privileges to the Hospital On active practice roster Intensivist Neonatologist Fellow (in training to become neonatologist or intensivist, Physician whose primary role is to manage care of patients in NICU or PICU Have worked on the unit for a minimum of 6 months *In non-ICU Settings* Appointment to Department of Pediatrics with admitting privileges to the Hospital On active practice roster General pediatrician, or pediatric speciality with academic appointment Fellows (Cardiology or CV Surgery Fellows) Identified by unit manager as a core physician who would be seen on the unit at least weekly	Residents or Students Physicians not currently engaged in clinical practice Surgeons or anaesthesiologist admitting patients post operatively to the ICU Medical Students Residents Physicians not currently engaged in clinical practice

Professional Group	Inclusion Criteria	Exclusion Criteria
Advanced Practice Nurses/Educators	Clinical nurse educators Clinical nurse specialists Advanced Nurse Practitioners Nurse practitioner Continuing Professional Education Role Clinical Staff Education Professional Practice Leaders Clinical Specialists Quality Improvement Specialists Clinical Research Nurses Patient Education (including discharge planning) Have worked on the unit for a minimum of 6 months Identified by unit managers	Academic staff (primary role as an assistant, associate, or full professor) Clinical Instructor who's primary role is supervising nursing students
Managers	Unit managers Patient care managers Have worked on the unit for a minimum of 6 months	Senior Executives Patient Care Directors

Table 3. Eligible Study Sample by Group and Site

Healthcare Professional Group	Pediatric Units			
	Unit 1	Unit 2	Unit 3	Total
Nurses[1]	64	105	193	362
Allied Providers	11	44	44	100
Physicians	19	10	21	50
Clinical Specialists	2	5	15	22
Managers	2	5	3	10
Total	**98**	**169**	**276**	**544**

[1]Registered Nurses and Licensed Practical Nurses

3.2.4 Data acquisition

Online survey (544 distributed)

The University of Alberta Population Research Laboratory (PRL) (http://www.uofaweb.ualberta.ca/prl/) was contracted to provide the following services for the CIHR Team in Children's Pain Project 2 pilot study: develop a final on-line version of the ACT, administer the survey, perform initial processing and cleaning of the data, and provide an electronic database in SPSS format with an accompanying survey codebook. The PRL developed the on-line survey using *The Survey System* – Version 9.0 for Windows (Creative Research Systems, Petaluma, CA) which was located on a secure web server at the University of Alberta. The five forms of ACT were formatted and entered into *The Survey System* as separate studies. Each study had its own database for purposes of correspondence, reminders, response rates and completed surveys.

Participant (n=544) lists of professionals in each of the five categories (nurses, allied providers, physicians, clinical specialists, and managers) from the three participating units were made available to the PRL. All 544 individuals included on the participant list were assigned passwords with five alpha characters by the PRL. The passwords served multiple purposes in the study. They were used by the participants to access on-line versions of the survey, and to complete it over more than one session if they wished. They also allowed for confidentiality and anonymity of survey responses. The PRL research coordinator also used the passwords to update sample numbers, send out reminder letters, and match completed surveys to the three units. Respondents were allowed to complete the survey questions in any order and, with the exception of one question (nursing role), respondents were not forced to answer any question. Responses to survey questions automatically saved and respondents had the option of returning to the survey as many times as required.

Paper based survey (175 distributed)

Paper-based surveys were distributed with the reminder notification in the fourth week of the study to participants who had not completed the on-line survey. This allowed the evaluation of the Environmental Complexity Scale (ECS), which due to software limitations could not be converted to the web-based format by the contractor.

3.2.5 Event sequence and Response rate

As the survey was almost exclusively web-based, the period of fieldwork although intensive was relatively short. The data collection period for the study was slightly over 5 weeks. Table 4 below outlines the major events in the 5-week data collection period. **The overall response rate for the study was 66% (n=358)**. Response rates by professional groups are shown in Table 5.

Table 4. Data collection timeline, events and results

Date	Event	Response Rate
July 30, 2007	Study initiated	
July 30, 2007-August 10, 2007	Data collection (2 weeks)in progress	44%
August 10, 2007	1st reminder	
August 17, 2007	Data collection ongoing	57%
	Nurse participants received 2nd reminders plus paper surveys (175 distributed)	40 paper surveys returned
August 24, 2007		23% response rate for paper
September 7, 2007	Data collection completed	66% overall response rate

Table 5. Response Rate by Provider Group

Professional Group	Response Rate
Nurses	69%
Allied Providers	67%
Physicians	40%
Clinical Specialists	68%
Managers	70%

3.2.6   Data processing and cleaning

Data coding and data entry were embedded simultaneously within the data collection phase for the on-line surveys. During on-line survey completion, responses were entered directly into a group-specific database according to available code choices on the computer screen. The 40 paper surveys were coded manually and entered into an Excel file by Knowledge Utilization Studies Program (KUSP) staff. The PRL used SPSS for Windows software program to clean and process the data imported from the on-line surveys using a codebook provided by the CIHR Team in Children's Pain. The PRL provided the research team with a merged data file (i.e., all five provider groups in one file) in SPSS format (with variable names and labels) in addition to a coding and cleaning log.

Following receipt of the merged dataset from the PRL, additional data processing and cleaning were completed by KUSP staff. SPSS for Windows was also used to process and clean the data in-house. A Master codebook was developed indicating coding options (including missing and not applicable) for all ACT items.

In-house data cleaning involved several steps: frequency checks, random error checks of 10 % of the 40 paper surveys, and use of special SPSS syntax. The first step in the in-house cleaning process was the generation of frequency tables for all variables in the dataset to check for missing, out of range values, and skip patterns. Following these frequency checks, a computer generated random sample of 10% of the paper surveys was checked for data entry errors by two researchers. Systematic errors were noted and rectified. A pre-specified error rate of less than 5% was required. All errors, corrections, and related decisions were recorded in tracking tables and a

study *data preparation log* file. Following the random error check on the paper surveys, frequency tables for all variables in the dataset were again run to check for missing and out of range values. The final step in the cleaning process was the use of special SPSS add-on software called "Validate Data". This software was used to identify suspicious and invalid cases, variables, and data values. Some pre-analysis recoding was also performed.

In addition, cleaning involved detailed exploration of the missing data, *do not know* responses and outliers. Frequencies for missing and do not know responses were generated and reported in a "Report of Completeness and Outliers".

The evaluation of the Environmental Complexity Scale (ECS) (n=40) was conducted separately, according to a procedure provided by Dr. L.L. O'Brien-Pallas of the University of Toronto who developed the scale. Reliability coefficients for the subscales could not be calculated due to the small sample size. Additionally, there were large quantities of missing data; ranging from 10% to 70% missing responses for the stem questions. There were poor correlations between the ECS subscales and the research use questions, therefore, while we believe this scale measures an important construct we decided not to append the ECS to the instrument for administration in the main study.

3.2.7 Data products
Upon completion of data processing and cleaning the following items were created and saved on the KUSP server:
- Master SPSS dataset and accompanying PRL codebook
- Cleaned Master SPSS dataset with variable labels, value labels, and missing value specifications (after in-house cleaning)
- Index SPSS dataset with variable labels, value labels, and missing value specifications and also reverse coded variables and derived variables
- Index ACT survey and accompanying master index ACT survey codebook created by KUSP
- Electronic file in Excel with responses to open ended variables

The master datasets, in a single data file, contain responses for each participant on all ACT items. The index dataset, in addition to containing responses for each participant on all ACT items, also contains the derived variables (as explained in section 4.3.1 of this report). The index dataset also has matching word documents: the index survey and the index codebook. All analyses were conducted from the index dataset.

3.2.8 Data archiving
Data products (including the master and index datasets) resulting from this study have been saved on the KUSP server. The intention is to also digitally archive them using the Networked Social Science Tools and Resources (NESSTAR) software package, enabling a dynamic relationship between the study's metadata and data. Upon completion of the documentation, and after a period of exclusive investigator access, the digital archive will be stored either on the University of Alberta's data library server and/or in the newly formed secure data repository in KUSP and the Faculty of Nursing. Meanwhile, any inquiries regarding data access should be forwarded to Dr. Carole A. Estabrooks at (780) 492-3451 or by email at carole.estabrooks@ualberta.ca.

4.0 Pilot Test Results

4.1 Demographics

4.1.1 Gender

Overall, 88.3% of the healthcare professionals studied were female, while a quarter (8.7%) were male. Table 6 shows the gender distribution by professional group. Higher proportions of females comprised all professional groups with the exception of the physicians (70% male).

Table 6. Gender Distribution by Professional Group (n=358)

		Nurses	Allied Providers	Physicians	Clinical Specialists	Managers	Total
N (% of total sample)		249 (69.6)	67 (18.7)	20 (5.6)	15 (4.2)	7 (2.0)	358 (100)
Gender [N, (%)]	Male	8 (3.2)	9 (13.4)	14 (70)	0 (0)	0 (0)	31 (8.7)
	Female	238 (95.6)	52 (77.6)	5 (25)	15 (100)	6 (85.7)	316 (88.3)
	Missing Values	*3 (1.2)*	*6 (9.0)*	*1 (5)*	*0 (0)*	*1 (14.3)*	*11(3.1)*

4.1.2 Education

The majority of respondents indicated their highest level of education was either a diploma/certificate (37.7%) or a bachelor's degree (51.4%). Table 7 and Figure 2 display the education level distribution by professional group. A high proportion of those with diploma/certificate education were allied providers (58.2%) while those with bachelor's degree education mostly comprised nurses (61.4%) and manager (57.1%) groups. A large proportion of clinical specialists (46.7%) possessed masters level preparation. For the physicians, a medical degree comprised the highest level of education for the majority (80%). PhD/PharmD-level education made up 0.3% across all five professional groups.

Table 7. Education Distribution by Professional Group (n=358)

		Nurses	Allied Providers	Physicians	Clinical Specialists	Managers	Total
Education Level [N, (%)]	Diploma/Certificate	91 (36.5)	39 (58.2)	0 (0)	3 (20)	2 (28.6)	135 (37.7)
	Bachelor's Degree	153 (61.4)	22 (32.8)	0 (0)	5 (33.3)	4 (57.1)	184 (51.4)
	Medical Degree	1 (0.4)	0 (0)	16 (80)	0 (0)	0 (0)	17 (4.7)
	Masters Degree	1 (0.4)	1 (1.5)	2 (10)	7 (46.7)	0 (0)	11 (3.1)
	PhD/PharmD	0 (0)	0 (0)	1 (5)	0 (0)	0 (0)	1 (0.3)
	Missing Values	3 (1.2)	5 (7.5)	1 (5)	0 (0)	1 (14.3)	10 (2.8)

Figure 2. Bar Chart of Education level by Professional Group
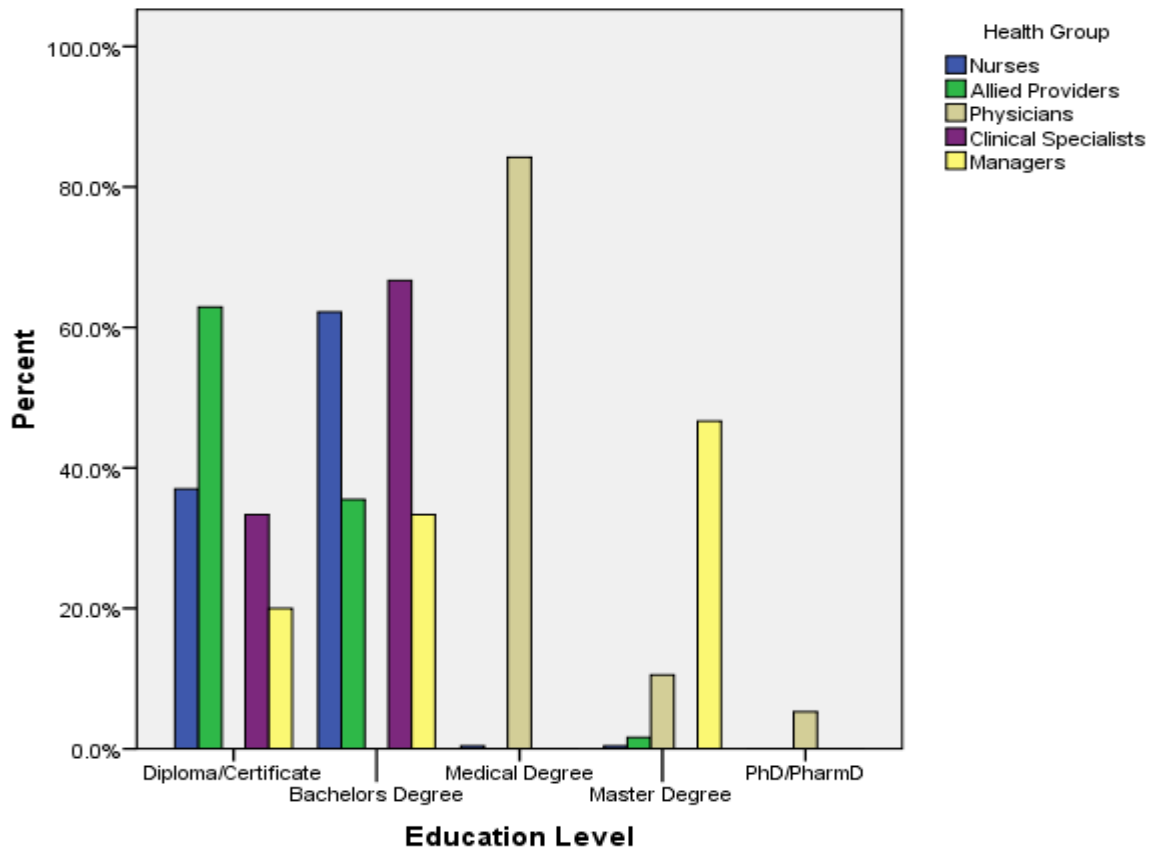
4.1.3 Experience

The number of years of experience varied by professional group, from a low of 2.8 years (managers) to a high of 19.4 years (clinical specialists). Table 8 shows the experience distribution by professional group.

Table 8. Experience by Professional Group

	Nurses	Allied Providers	Physicians	Clinical Specialists	Managers
Number of Years of Experience [mean, (SD)]	10.1 (9.6)	9.2 (10.5)	13.2 (10.5)	19.4 (11.0)	2.8 (2.9)

4.2 Psychometric analysis

Within the ACT, there are eight hypothesized dimensions of context: (1) leadership (2) culture(3) evaluation (4) organizational slack (5) structural and electronic resources (6) information sharing interactions(7) information sharing activities and (8) information sharing social processes, each having its own scale within the tool. While there are also a few single items within the tool (e.g., job satisfaction, adequate knowledge for one's job) hypothesized to measure context, only three of the eight scales listed above were examined with factor analysis.

4.2.1 Missing data

We used listwise deletion to deal with missing data because it leads to unbiased parameter estimates. However, to maximise sample size for analysis of correlations, pairwise deletion was used.

4.2.2 Factor Analysis

In the *Utilization of Research in Acute Care Settings in Alberta* (AKUTE) study, factor analysis was conducted on 51 items, measuring 8 hypothesized dimensions of context, contained within the ACT instrument. A fourteen-factor solution accounting for 69.97% of the variance in organizational context resulted (Estabrooks, et al., 2008). Due to sample size restrictions and decreased variance resulting from scale modifications, for this pilot study we present factor analysis results only for the items belonging to the culture, leadership and evaluation scales. In the technical report of the main study, which will be conducted on a larger pediatric dataset, we will report the factor analysis of the 8 hypothesized context dimensions.

The hypothesized culture, leadership and evaluation dimensions of organizational context were derived directly from the PARiHS framework. Each dimension has its own scale or set of items within the instrument: (1) leadership (6 items), (2) culture (5 items), (3) evaluation (6 items). To validate these dimensions within the ACT we used factor analytic procedures with Principal Components Analysis (PCA). A PCA creates distinct factors by allowing the first factor to account for the maximum amount of variance within the data, and then each succeeding factor extracting the maximum of the remaining unexplained variance. In our analysis, factors with eigenvalues greater than 1 were extracted. Varimax rotation with Kaiser normalization was used to enhance interpretability of findings. The factor analysis reported in Table 9 is on the 17 items contained within the culture, leadership and evaluation scales.

A three-factor solution that accounted for a total of 61.84% of the variance of *organizational context* was produced. One item, *our team is clear on clients' wants and needs and work to provide it*, from the culture scale loaded almost equally on two factors and was subsequently removed from the analysis because it was considered to be a poorly worded item. The factor loadings and percentage of variance explained (for each factor and cumulatively) for organizational context as measured by the ACT are summarized in Table 9. The first factor (eigenvalue of 5.469) *leadership* accounted for the majority of the variance at 25.25%. *Evaluation* the second factor (eigenvalue of 3.108) accounted for 23.83% of the variance. The third factor (eigenvalue of 1.317) *culture,* accounted for 12.76% of the variance.

4.2.3 Internal reliability

Internal consistency (reliability) was examined using Cronbach's alpha (α) for each core scale (α range = .478 – .902). Table 10 displays the Cronbach's alpha coefficients for the eight hypothesized context dimensions. Five dimensions exceeded the acceptable standard (.70) for new scales. However, two dimensions (structural and electronic resources, and information sharing activities) fell short of this measure with Cronbach's alpha scores of .628 and .478 respectively. For one dimension (information sharing interactions), Cronbach's alpha scores were calculated separately for each professional group because the items contained within the scale were specific to and differed in number for the respective groups. Cronbach's alpha scores for the groups ranged from .815 to .634 with two groups (nurses and allied providers) scoring below the acceptable standard of .7 on this scale.

4.3 Bivariate analysis

4.3.1 Derived scores for the hypothesized context dimensions

For each hypothesized context dimension there are several items to measure the individual dimension. To facilitate the analysis of the relationships between the hypothesized context dimensions and between each dimension and our dependent variable, research use, we combined the individual items within each dimension to calculate derived scores. We used three approaches to obtain subscale scores:

1. *Mean score method*: The mean of the subscale variables is equal to the derived score. This method was used with the following ACT subscales: leadership, culture, evaluation, organizational slack, and information sharing social processes.

2. *Simple count method*: First we recoded the scores of each individual item as follows - if the respondent self-reported using the item frequently or very frequently, they scored 1 (using the item). If they self-reported never, rarely, or occasionally using the item they scored 0 (not using the item). The derived score for the subscale then equals the sum of the individual items. This method was used for the ACT subscales: structural and electronic resources and information sharing activities.

3. *Complex count method*: The simple count method described in #2 is performed followed by the division of the overall count by its corresponding maxima. This method was use to derive the information sharing interactions variable only. It was required because the number of items in the information sharing interactions scale for all of the five professional groups differ in number. The standardized procedure was developed for scale comparison across all groups.

To facilitate analysis, we also recoded some of the demographic variables; namely health group (into variables for nurses, allied providers, physicians, clinical specialists, and managers), education (into one variable to reflect highest level obtained) and years of experience (into year categories).

Table 9. ACT Principal Component Analysis (Factors 1-3) (n=275)

Dimension, Items	Factor Loadings Factor 1	Factor 2	Factor 3	% Explained Variance (Cumulative)
LEADERSHIP				
Looks for feedback to ideas and initiatives even when it is difficult to hear	.791			25.25
Focuses on successes and potential rather than failures	.742			(25.25)
Calmly handles stressful situations	.723			
Actively listens, acknowledges, and responds to requests and concerns	.863			
Actively mentors and coaches individual and team performance	.809			
Effectively resolves conflicts that arise	.815			
EVALUATION				
I routinely receive information on my team's performance on data like…..		.717		23.83
Our team routinely discusses this data informally		.708		(49.08)
Our team has a scheduled formal process for discussing this data		.751		
Our team routinely formulates action plans based on the data		.869		
Our team routinely monitors our performance …		.851		
Our team routinely compares our performance with others		.779		
CULTURE				
I receive recognition from others …			.729	12.76
I am a member of a supportive work group			.760	(61.84)
My organization effectively balances best…			.654	
Our team is clear on what patients want …			.518	

Table 10. ACT Internal Consistency (n=358)

ACT Dimension	Internal Reliability coefficient
Culture	.708
Leadership	.902
Evaluation	.872
Organizational slack	.802
Structural and Electronic Resources	.628
Information Sharing Social Processes (Social Capital)	.824
Information Sharing Interactions --- Nurses	.634
Information Sharing Interactions --- Allied Providers	.681
Information Sharing Interactions --- Physicians	.731
Information Sharing Interactions --- Clinical Specialists	.815
Information Sharing Activities	.478

Sample size is too small to calculate internal reliability coefficient of Information Sharing Interactions for managers.

4.3.2   Reliability of aggregated scores

While the ACT subscales and our dependent variable, research utilization, were measured at the individual level, the unit of analysis in this study was the patient care *unit*. To create unit-level scores, data collected at the individual-level were aggregated to the level of the unit by calculating group means. One-way analysis of variance (ANOVA) was performed for each variable using the unit as the group variable. The source table from the one-way ANOVA was used to calculate the following indices: (1) interclass correlation ICC(1) = (BMS-WMS)/ (BMS+ [K-1] WMS), where BMS is the between-group mean square, WMS is the within-group mean square, and where K is the individual unit group size (or number of respondents per unit). The average K for unequal group size was calculated as $K = (1/[N-1]) (\sum K - [\sum K^2 / \sum K])$ where N=3 (number of units) for the sample; (2) interclass correlation ICC(2) = (BMS-WMS)/BMS; (3) η^2 = SSB/SST, where SSB is the sum of squares between groups and SST is the sum of squares total; and (4) ω^2 = (SSB – [N-1]WMS) / (SST+ WMS). Sometimes, BMS will be less than WMS (and

thus the F-value will be less than 1), resulting in a negative estimate for both ICC(1) and ICC(2). This is a problem, because both theoretical values range from 0 to 1, by definition. The usual recommendation is to convert a negative estimate to zero. When the F-value is less than 1, we will also have a negative estimate of the ω^2 value. Conventionally, we also report this value as zero.

"ICC (1) is an estimate of individual score variability about the subgroup mean. That is, the ICC(1) index is used to assess perceptual agreement among individual responses within an observational group...".[f] In other words, ICC(1) provides an estimate of the variation in individual scores around the mean score for that subgroup. "Theoretical values of ICC(1) range between 0 and 1, with a value of 1 indicating perfect perceptual agreement among members within the same group".[g] The literature suggests ICC(1) values from 0 to .5 justify a degree of perceptual agreement among group subjects.[h] ICC(2) is an estimate of stability of aggregated data at the group level. It provides an index of mean subject reliability of the aggregated data and is interpreted as the extent to which similar mean scores would be obtained if subsequent samples of respondents were drawn repeatedly from the same group.[i] This is to say, ICC(2) estimates the degree to which similar average groups scores would be attained if the study were repeated with the same sample.ICC(2) values exceeding .6 justify aggregation of data at the group level. Eta-squared (η^2) provides an "indicator of reliability and contributes to the proportion of variance in the dependent variable that is accounted for by group membership".[j] In summary, eta-squared (η^2) is a measure of the proportion of total sample variation in the dependent variable, which can be predicted by another variable. Omega-squared ($\omega^{2)}$) "provides the relative measure of the strength of aggregated data as an independent variable, and is used as an indicator of effect size".[k] $\omega^2 < 0.06$ refers to a small or no effect; $0.06 < \omega^2 < .15$ a medium effect; and $\omega^2 > .15$ a large effect. In other words, omega squared ($\omega^{2)}$) is an estimate of the population variance in the dependent variable that is explained by another variable.

Table 11 contains the reliability and validity values of the data aggregated at the unit level for the whole sample (n=358), and Tables 12 and 13 contain the reliability and validity values for the nurse (n=249) and allied (n=67) subgroups respectively. Most of the ICC(1) values, regardless of subgroup, were greater than zero, suggesting a degree of perceptual agreement existed among subjects from the same unit. The relatively low ICC(1) values for most variables however indicates the intra-agreement among subjects was relatively weak. ICC(2) indices indicate good reliability for the whole sample for several of our contextual variables (i.e., culture, leadership, evaluation, organizational slack, and burnout) and two of our research utilization variables (conceptual research utilization, and instrumental research utilization) with p values <0.05 and ICC(2) values >0.60. In the nurse subgroup, additional contextual variables (i.e., information sharing activities and job satisfaction) also demonstrated evidence of good reliability. Indices for the allied subgroup were strong for a fewer number of contextual variables in comparison to the whole sample and nurse subgroup (see Table 13). The relative effect sizes for both η^2 and ω^2 for all three samples were small, suggesting that as data were aggregated, less information than optimal was carried up from the individual level to the unit level.

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[f] **Estabrooks**, C.A., Midodzi, W.K., Cummings, G.G., Wallin, L., & Adewale, A. (2007). Predicting research use in nursing organizations: A multilevel analysis. *Nursing Research, 56*(4), Supplement 1, S12.
[g] Ibid
[h] Ibid
[i] Ibid, S13
[j] Ibid,
[k] Ibid

Table 11. Reliability and Validity of Data Aggregated at Unit Level for Whole Sample (n=358)

	F-value	BMS	WMS	ICC(1)	ICC(2)	η^2	ω^2
Eight Hypothesized Dimensions of Context							
Culture	16.501*	6.447	0.391	0.127	0.939	0.089	0.083
Leadership	14.764*	9.044	0.613	0.120	0.932	0.085	0.079
Evaluation	11.847*	6.326	0.534	0.103	0.916	0.073	0.067
Organizational slack	12.254*	19.435	1.586	0.096	0.918	0.068	0.062
Structure Resources	2.253	6.141	2.726	0.013	0.556	0.015	0.008
Information Sharing Interactions	0.713	0.036	0.050	0.000	0.000	0.005	0.000
Information Sharing Social Process	5.054*	14.039	2.778	0.039	0.802	0.031	0.025
Information Sharing Activities	1.317	1.560	1.184	0.004	0.241	0.010	0.002
Single-Item (additional) Context Concepts							
Adequate Knowledge	0.550	0.192	0.349	0.000	0.000	0.003	0.000
Job Satisfaction	0.650	0.484	0.744	0.000	0.000	0.004	0.000
Non-Context (Burnout)							
Burnout (Exhaustion)	3.687*	4.635	1.257	0.024	0.729	0.021	0.015
Burnout (Cynicism)	3.260*	3.894	1.195	0.021	0.693	0.019	0.013
Burnout (Efficacy)	0.231	0.206	0.889	0.000	0.000	0.001	0.000
Non-Context (Dependent Variable – Research utilization)							
IRU	6.994*	11.267	1.611	0.055	0.857	0.042	0.036
CRU	17.243*	24.859	1.442	0.131	0.942	0.092	0.086
PRU	0.107	0.202	1.880	0.000	0.000	0.001	0.000
ORU	2.323**	3.777	1.626	0.014	0.569	0.015	0.009

*.significant at $p < 0.5$ and **.significant at $p < 0.10$

Table 12. Reliability and Validity of Data Aggregated at Unit Level for Nurse Gp.(n=249)

	F-value	BMS	WMS	ICC(1)	ICC(2)	η^2	ω^2
Eight Hypothesized Dimensions of Context							
Culture	17.154*	6.435	0.375	0.179	0.942	0.128	0.120
Leadership	15.410*	8.777	0.570	0.170	0.935	0.122	0.114
Evaluation	12.057*	5.513	0.457	0.142	0.917	0.103	0.094
Organizational slack	6.418*	8.815	1.373	0.068	0.844	0.052	0.043
Structure Resources	0.466	1.272	2.728	0.000	0.000	0.005	0.000
Information Sharing Interactions	0.912	0.041	0.044	0.000	0.000	0.009	0.000
Information Sharing Social Process	4.490*	13.254	2.952	0.048	0.777	0.039	0.030
Information Sharing Activities	2.941**	3.540	1.204	0.035	0.660	0.035	0.023
Single-Item (additional) Context Concepts							
Adequate Knowledge	1.139	0.406	0.356	0.002	0.122	0.009	0.001
Job Satisfaction	2.624**	2.125	0.810	0.021	0.619	0.021	0.013
Non-Context (Burnout)							
Burnout (Exhaustion)	5.218*	6.462	1.238	0.052	0.808	0.041	0.033
Burnout (Cynicism)	4.921	6.161	1.252	0.049	0.797	0.039	0.031
Burnout (Efficacy)	0.020*	0.018	0.892	0.000	0.000	0.000	0.000
Non-Context (Dependent Variable – Research utilization)							
IRU	2.907**	5.272	1.814	0.026	0.656	0.025	0.017
CRU	12.195*	17.683	1.450	0.130	0.918	0.093	0.085
PRU	0.382	0.754	1.976	0.000	0.000	0.003	0.000
ORU	2.162	3.793	1.754	0.017	0.538	0.021	0.011

*.significant at $p < 0.5$ and **.significant at $p < 0.10$

Table 13. Reliability and Validity of Data Aggregated at Unit Level for Allied Gp.(n=67)

	F-value	BMS	WMS	ICC(1)	ICC(2)	η^2	ω^2
Eight Hypothesized Dimensions of Context							
Culture	5.102*	1.159	0.227	0.173	0.804	0.141	0.112
Leadership	0.430	0.192	0.447	0.000	0.000	0.015	0.000
Evaluation	0.337	0.223	0.663	0.000	0.000	0.014	0.000
Organizational slack	10.965*	15.216	1.388	0.340	0.909	0.268	0.240
Structure Resources	1.716	3.341	1.947	0.038	0.417	0.058	0.024
Information Sharing Interactions	3.169**	0.090	0.028	0.116	0.685	0.113	0.055
Information Sharing Social Process	2.731**	5.501	2.015	0.087	0.633	0.087	0.076
Information Sharing Activities	0.455	0.490	1.076	0.000	0.000	0.019	0.000
Single-Item (additional) Context Concepts							
Adequate Knowledge	0.559	0.164	0.294	0.000	0.000	0.018	0.000
Job Satisfaction	0.096	0.026	0.271	0.000	0.000	0.004	0.000
Non-Context (Burnout)							
Burnout (Exhaustion)	0.058	0.077	1.319	0.000	0.000	0.002	0.000
Burnout (Cynicism)	2.136	1.790	0.838	0.058	0.532	0.070	0.036
Burnout (Efficacy)	2.825**	2.097	0.742	0.088	0.656	0.087	0.056
Non-Context (Dependent Variable – Research utilization)							
IRU	8.725*	9.056	1.038	0.305	0.885	0.248	0.216
CRU	4.294*	5.867	1.366	0.147	0.767	0.127	0.096
PRU	0.285	0.530	1.860	0.000	0.000	0.012	0.000
ORU	0.408	0.530	1.300	0.000	0.000	0.015	0.000

*.significant at $p < 0.5$ and **.significant at $p < 0.10$

4.3.3 Tests of Difference

4.3.3.1 By patient care unit

Table 14 displays the mean/median scores and the test of difference statistic values (by unit) for the eight context dimensions and for select additional variables (including the research use variables) contained within the ACT. Mean scores (ANOVA, F Test Statistic) are used for all variables except for the three context variables for which our derived score was based on the "count method": structural and electronic resources, information sharing interactions and information sharing activities. For these three variables the median is presented along with the test statistic value from a nonparametric test of difference (Kruskal Wallis, χ^2 test statistic).

Statistically significant differences were found for culture, leadership, evaluation and organizational slack, as well as information sharing social processes, and structural and electronic resources scores across the three units. (Table 14). For the Maslach Burnout Inventory (MBI) there were statistically significant differences across the three units for the burnout (exhaustion) and burnout (cynicism) scores.

Statistically significant differences were also noted between units in the dependent research utilization variables. Instrumental research utilization (IRU) was higher in unit 3 (mean = 3.5, SD = 1.24) compared to the remaining two units [unit 1: mean = 2.81, SD = 1.32, unit 2: mean = 3.27, SD = 1.27]. Similarly, conceptual research utilization (CRU) was also higher in unit 3 (mean = 3.83, SD = 1.09) compared with the remaining two units [unit 1: mean = 3.26, SD = 1.26; unit 2: mean = 2.99, SD = 1.33].While not statistically different from the other units, unit 3 also had the highest score for overall research utilization (ORU) (mean = 3.45, SD = 1.22). Unit 2 had the highest scores for persuasive research utilization (PRU) (mean=2.63, SD=1.35).

4.3.3.2 By Professional Group

Table 15 displays the mean/median scores and the test of difference statistical values (by professional group) for the eight context dimensions and for select additional variables (including our research utilization variables) contained within the ACT. Again, mean scores (ANOVA, F Test Statistic) are used for all variables except for the three context variables for which our derived score was based on the "count method". For these variables the median is presented along with the test statistic value from a nonparametric test of difference (Kruskal Wallis, χ^2 test statistic).

Statistically significant differences in scores for all eight dimensions of context between the five professional groups were evident. Managers reported the highest scores in culture (mean = 4.03, SD = 0.73), evaluation (mean = 4.07, SD = 0.93) and information sharing interactions (median=0.889) scores. Allied providers reported the highest score for leadership (mean=3.96, SD=0.66) and organizational slack (mean=6.47, SD=1.35). Clinical specialists reported the highest scores for information sharing social processes (mean=12.70, SD=1.24) and structural and electronic resources (median=8). Physicians and clinical specialists reported the equal highest score (median=6) for information sharing activities while nurses, allied providers and managers reported a median score of 5.

Clinical specialists reported the lowest culture (mean=3.46, SD=0.67) and leadership (mean=2.79, SD=0.78) scores. Allied providers reported the lowest evaluation (mean = 3.19, SD = 0.80) score. Nurses reported the lowest scores on the organizational slack (mean=5.37, SD=1.20), information sharing social processes (mean=11.71, SD=1.75) and information sharing interactions (median=0.571) dimensions. The physicians reported the lowest structural and electronic resources (median=4) score.

For single item context concepts, a statistically significant difference in job satisfaction was found across the five groups. Managers reported the highest level of job satisfaction (mean=4.83, SD=0.41) while nurses had the lowest score on job satisfaction (mean=3.93, SD=0.91). With respect to non-context variables in the ACT, scores on the burnout component (exhaustion) were statistically significantly different between the professions, with managers scoring the lowest (mean = 2.06, SD = 1.08) and nurses scoring the highest (mean=3.14, SD=1.13). Significant differences using ANOVA were also noted in scores obtained on the dependent research utilization variable, persuasive research utilization (PRU). PRU was marginally higher among nurses (mean=2.70, SD=1.40) compared with clinical specialists (mean =2.69, SD=1.32) and lowest among physicians (mean=1.79, SD=0.71).

Table 14. Tests of Difference by Unit (n=358)

	Mean (SD) / Median				ANOVA/Kruskal Wallis	
	Whole Sample	Unit 1	Unit 2	Unit 3	F-Statistic/ Chi Square	p-value
Eight Hypothesized Dimensions of Context						
Culture	3.58 (0.65)	3.96 (0.57)	3.43 (0.68)	3.52 (0.61)	16.501	.000
Leadership	3.55 (0.82)	4.02 (0.80)	3.36 (0.83)	3.49 (0.74)	14.765	.000
Evaluation	3.32 (0.76)	3.11 (0.83)	3.62 (0.71)	3.22 (0.70)	11.848	.000
Organizational slack	5.62 (1.30)	5.45 (1.25)	5.95 (1.30)	5.62 (1.30)	12.254	.000
Information Sharing Social Processes	11.89 (1.69)	12.37 (1.43)	11.53 (1.95)	11.89 (1.57)	5.054	.007
Structural and Electronic Resources	7.00	7.00	7.00	7.00	6.394	.041
Information Sharing Interactions	.5714	.5714	.6667	.5714	2.366	.306
Information Sharing Activities	5.00	5.00	5.00	5.00	1.246	.536
Single-Item (additional) Context Concepts						
Adequate Knowledge	4.21 (0.59)	4.14 (0.54)	4.23 (0.62)	4.22 (0.59)	.550	.577
Job Satisfaction	4.05 (0.86)	4.08 (0.82)	3.97 (0.87)	4.09 (0.88)	.650	.523
Non-Context (Burnout)						
Burnout (Exhaustion)	2.97 (1.13)	3.19 (1.15)	3.08 (1.20)	2.81 (1.06)	3.686	.026
Burnout (Cynicism)	2.77 (1.10)	2.74 (1.20)	3.00 (1.11)	2.65 (1.04)	3.260	.040
Burnout (Efficacy)	4.85 (0.94)	4.92 (0.96)	4.83 (0.83)	4.85 (1.00)	.231	.794
Non-Context (Dependent Variable – Research utilization)						
IRU	3.28 (1.29)	2.81 (1.32)	3.27 (1.27)	3.50 (1.24)	6.994	.001
CRU	3.46 (1.26)	3.26 (1.26)	2.99 (1.33)	3.83 (1.09)	17.242	.000
PRU	2.59 (1.37)	2.55 (1.49)	2.63 (1.35)	2.57 (1.33)	.107	.898
ORU	3.28 (1.28)	3.08 (1.30)	3.17 (1.33)	3.45 (1.22)	2.323	.100

Note: ANOVA (F-statistic) used to compare means; Kruskal-Wallis (chi-square) used to compare medians. ▢ Denotes statistically significant differences among sites.

Table 15.Tests of Difference by Professional Group (n=358)

	Mean (SD) / Median						ANOVA/Kruskal Wallis	
	Whole Sample	Nurses	Allied Providers	Physicians	Clinical Specialists	Managers	F-Statistic/ Chi Square	p-value
Eight Hypothesized Dimensions of Context								
Culture	3.57 (0.65)	3.49 (0.65)	3.91 (0.51)	3.50 (0.68)	3.46 (0.67)	4.03 (0.73)	2.734	.000
Leadership	3.55 (0.82)	3.49 (0.80)	3.96 (0.66)	3.62 (0.82)	2.79 (0.78)	3.76 (0.96)	8.080	.000
Evaluation	3.32 (0.76)	3.29 (0.71)	3.19 (0.80)	3.45 (0.77)	3.76 (0.91)	4.07 (0.93)	3.500	.008
Organizational slack	5.62 (1.30)	5.37 (1.20)	6.47 (1.35)	5.85 (1.28)	5.55 (1.17)	5.83 (1.44)	10.107	.000
Information Sharing Social Processes	11.89 (1.69)	11.71 (1.75)	12.33 (1.46)	11.86 (1.36)	12.70 (1.24)	12.10 (2.63)	2.622	.035
Structural and Electronic Resources	7.00	5.00	5.00	4.00	8.00	6.00	17.722	.001
Information Sharing Interactions	0.571	0.571	0.667	0.786	1.00	0.889	61.929	.000
Information Sharing Activities	5.00	5.00	5.00	6.00	6.00	5.00	32.834	.000
Single-Item (additional) Context Concepts								
Adequate Knowledge	4.21 (0.59)	4.19 (0.60)	4.25 (0.54)	4.16 (0.76)	4.33 (0.49)	4.33 (0.52)	0.441	.779
Job Satisfaction	4.05 (0.86)	3.93 (0.91)	4.35 (0.51)	4.32 (0.82)	4.13 (0.99)	4.83 (0.41)	5.022	.001
Non-Context (Burnout)								
Burnout (Exhaustion)	2.97 (1.13)	3.14 (1.13)	2.65 (1.13)	2.65 (0.81)	2.27 (0.63)	2.06 (1.08)	5.742	.000
Burnout (Cynicism)	2.78 (1.10)	2.88 (1.14)	2.54 (0.93)	2.56 (1.01)	2.53 (1.12)	2.33 (0.99)	1.850	.199
Burnout (Efficacy)	4.86 (0.94)	4.83 (0.94)	5.01 (0.89)	4.51 (0.98)	5.07 (1.05)	4.89 (1.03)	1.300	.270
Non-Context (Dependent Variable – Research utilization)								
IRU	3.28 (1.29)	3.27 (1.36)	3.38 (1.15)	2.74 (1.05)	3.73 (1.03)	3.00 (0.89)	1.454	.216
CRU	3.46 (1.26)	3.55 (1.26)	3.27 (1.23)	2.83 (1.15)	3.67 (1.23)	3.00 (1.29)	2.130	.077
PRU	2.59 (1.37)	2.70 (1.40)	2.41 (1.34)	1.79 (0.71)	2.69 (1.32)	2.14 (1.21)	2.462	.045
ORU	3.28 (1.28)	3.28 (1.33)	3.37 (1.13)	2.83 (1.20)	3.77 (1.17)	2.57 (0.98)	1.638	.165

Note: ANOVA (F-statistic) used to compare means; Kruskal-Wallis (chi-square) used to compare medians.

Denotes statistically significant differences among sites.

4.3.4 Correlations

Tables 16 through 18 display the Pearson Product-Moment correlation coefficients for variables within the ACT (including the dependent research utilization variables) for the whole sample, nurses and allied providers respectively. Correlations for the physicians (n =20), clinical specialists (n =15) and managers (n =7) were not performed due to their small sample sizes.

Examining the sample as a whole, several contextual variables were correlated at statistically significant levels with research utilization, as displayed in Table 16. Evaluation was positively correlated (at statistically significant levels) with all four types of research utilization: instrumental research utilization, conceptual research utilization, persuasive research utilization, and overall research utilization. Additionally, the structural and electronic resources scale was positively correlated (at statistically significant levels) with three of the four types of research utilization: instrumental research utilization, conceptual research utilization and overall research utilization. Organizational slack and information sharing interactions were positively correlated (at statistically significant levels) with two forms of research utilization each. Organizational slack was significantly correlated with instrumental and conceptual research utilization, while information sharing interactions was significantly correlated with persuasive and overall research utilization. Culture, leadership, information sharing social processes and information sharing activities were not statistically significantly associated with research utilization. These findings suggest that some aspects of context as we measured it are positively associated with increased research utilization, namely evaluation, structural and electronic resources, organizational slack and information sharing interactions.

Adequate knowledge and job satisfaction were not significantly correlated with research utilization. The cynicism subscale of the burnout inventory was negatively (and significantly) correlated with instrumental research use. The exhaustion and efficacy subscales of the burnout inventory were not significantly correlated with research utilization. The efficacy subscale was positively and significantly correlated with all dimensions of work context, with the exception of leadership. The cynicism subscale was negatively and significantly correlated with these dimensions, suggesting more positive contexts were associated with greater efficacy and less negativity towards one's work.

A similar pattern was observed with the nurse sample (Table 17). Evaluation, structural and electronic resources, and information sharing interactions were statistically significantly correlated with all four types of research utilization. In this group culture correlated at a statistically significant level with three types of research use: instrumental, conceptual and persuasive. In addition, leadership was statistically significantly correlated with instrumental and conceptual research use. For the allied health professionals (Table 18) there were no statistically significant correlations between the context and research utilization variables within the ACT.

Table 16. Correlations for Whole Sample (n=358)

	IRU	CRU	PRU	ORU	Culture	Leader.	Eval.	Interact	Slack	Str. Res	SocialProcess	Activities	Adeq. Know	Job Sat.	Burnout Exhaust	Burnout Cynicism	Burnout Efficacy
IRU	1.00																
CRU	.480**	1.00															
PRU	.466**	.441*	1.00														
ORU	.470***	.531*	.435**	1.00													
Culture	.104	.067	.067	.082	1.00												
Leader.	.109	.078	.085	.006	.539**	1.00											
Eval.	.208***	.130*	.159**	.138*	.291**	.219**	1.00										
Interact.	.100	.095	.125*	.159**	.206**	.096	.282**	1.00									
Slack	.165**	.119*	.046	.077	.305**	.315**	.123*	.132*	1.00								
Str. Res.	.192***	.172*	.102	.175**	.201**	.137*	.149*	.443**	.176**	1.00							
Social Processes	.093	.057	.101	.070	.526**	.334**	.194**	.294**	.257**	.230**	1.00						
Activities	.001	.034	.107	.093	.188**	.188***	.225**	.437**	.098	.367**	.224**	1.00					
Adq.Know	.027	.025	.012	-.042	.021	-.039	.072	.068	.062	.030	.172**	.028	1.00				
Job Sat	.070	.021	.019	.031	.404**	.405**	.214**	.204**	.331**	.098	.326**	.175**	.160***	1.00			
Burnout Exhaust	-.082	.053	.015	.000	-.151**	-.170**	-.066	-.212**	-.342**	-.104	-.097	-.068	-.061	-.532**	1.00		
Burnout Cynicism	-.144*	-.034	-.010	-.109	-.354**	-.334**	-.153**	-.249**	-.373**	-.146*	-.217**	-.148*	-.002	-.601**	.640**	1.00	
Burnout Efficacy	.096	.090	.110	.086	.224**	-.094	.121*	.254**	.209**	.207**	.316**	.176**	.232***	.242**	-.140**	-.271**	1.00

$* = p<.05; ** = p<.01$

Table 17. Correlations for Nurses (n=249)

	IRU	CRU	PRU	ORU	Culture	Leader.	Eval.	Interact.	Slack	Str. Res	SocialProcess	Activities	Adeq. Know	Job Sat.	Burnout Exhaust	Burnout Cynicism	Burnout Efficacy
IRU	1.00																
CRU	.502**	1.00															
PRU	.481**	.409**	1.00														
ORU	.511**	.510**	.448**	1.00													
Culture	.157*	.166*	.137*	.122	1.00												
Leader.	.186**	.140*	.137	.037	.581**	1.00											
Eval.	.247**	.176*	.156*	.185*	.227**	.257**	1.00										
Interact.	.186**	.150*	.255**	.205**	.218**	.158*	.267**	1.00									
Slack	.139*	.209**	.091	.152*	.291**	.299**	.131	.167*	1.00								
Str. Res.	.276***	.229**	.164*	.221**	.202**	.127	.141	.368**	.135	1.00							
Social Processes	.112	.050	.153*	.098	.563**	.365**	.198**	.268**	.236**	.209**	1.00						
Activities	.029	.033	.218**	.111	.228**	.246**	.226**	.345**	.127	.314**	.234**	1.00					
Adeq.Know	.024	-.010	.046	-.055	.014	-.019	.084	.045	-.014	.003	.168*	.006	1.00				
Job Sat	.054	.055	.011	.005	.392**	.441**	.228**	.185**	.346**	.070	.308**	.140	.190**	1.00			
Burnout Exhaust	-.068	.026	.022	-.020	-.146*	-.183**	-.064	-.141*	-.346**	-.044	-.095	-.024	-.044	-.549**	1.00		
Burnout Cynicism	-.177***	-.082	.012	-.133	-.380**	-.349**	-.138*	-.221**	-.423**	-.099	-.225**	-.089	.017	-.618**	.642**	1.00	
Burnout Efficacy	.143*	.068	.097	.118	.253**	.120	.144*	.277**	.267**	.178*	.325**	.225**	.188***	.264**	-.171**	-.275***	1.00

* = p<.05; ** = p<.01

Table 18 Correlations for Allied Providers (n=67)

	IRU	CRU	PRU	ORU	Culture	Leader.	Eval.	Interact.	Slack	Str. Res	SocialProcess	Activities	Adeq. Know	Job Sat.	Burnout Exhaust	Burnout Cynicism	Burnout Efficacy
IRU	1.00																
CRU	.366**	1.00															
PRU	.460**	.459**	1.00														
ORU	.313*	.634***	.377***	1.00													
Culture	-.029	-.090	-.145	.100	1.00												
Leader.	-.078	.156	.069	.047	.004	1.00											
Eval.	.142	.085	.132	.190	.420**	.258	1.00										
Interact.	-.260	.118	-.108	.055	.213	.284	.190	1.00									
Slack	.258	.071	.087	-.061	-.087	.084	.017	-.266	1.00								
Str. Res.	-.194	-.022	-.059	.125	.099	.232	.304*	.521**	-.052	1.00							
Social Processes	-.111	.170	-.103	-.052	.153	.099	-.124	.378**	.086	.240	1.00						
Activities	-.071	.244	.053	.272	.165	.202	.095	.473**	-.214	.289*	.175	1.00					
Adq. Know	-.050	.103	.053	.068	-.033	.024	-.065	.014	.183	.131	.182	.139	1.00				
Job Sat	.165	.001	.263	.139	.152	-.043	-.081	.094	-.011	.055	.126	.229	.083	1.00			
Burnout Exhaust	-.241	-.025	-.264	-.014	.067	-.049	.023	.026	-.116	.051	.067	.096	-.035	-.512**	1.00		
Burnout Cynicism	.049	-.015	-.190	-.153	-.135	-.150	-.068	-.182	.092	-.078	-.033	-.163	-.059	-.399**	.588**	1.00	
Burnout Efficacy	-.250	.034	.070	-.169	.113	.158	-.063	.217	-.081	.266*	.349**	.173	.279*	.051	.024	-.211	1.00

* = p<.05; ** = p<.01

4.3.5   Process Evaluation

To evaluate the process of survey delivery, analysis of the nurses' response rates, survey completion times and reasons for choosing the web-based or paper-based survey options was conducted. Prior to circulation of the first reminder a 45% response rate from nurses was achieved. The response rate rose to 55% prior to distribution of the second reminder. In conjunction with the second reminder the nurse group were also supplied with a paper-based survey. The second reminder coincided with a further 14% increase in nurses' response rate. Following the second reminder the majority of the nurse respondents (74%) elected to use the paper-based survey format. In total, 84% of all nurse respondents chose the web-based survey option.[1]

Chi-square and independent t-test analysis found no statistically significant differences in demographic characteristics between nurse respondents who chose the web-based survey option and those who chose the paper-based option.[m] The average time taken for nurses to complete the survey was 24 minutes. A statistically significantly shorter mean time was taken to complete the web-based survey (22 minutes) compared with a mean of 33 minutes for the paper-based version ($p \leq .01$).[n] Nurses responding to the web-based survey (73%) were more likely to complete the survey in one sitting when compared with those completing the paper-based survey (40%).[o] Eight-four percent of nurse respondents completed the survey during work time. Nurse respondents who chose to complete the paper-based survey were invited to comment on why they had not completed the web-based survey.[p] The most prominent reasons for this choice were: (1) the respondent preferred the flexibility of using the paper version; (2) the respondent did not have access to the internet at home; and (3) the respondent believed completion of the survey using the web would be more time consuming.[q]

Overall, the recruitment process employed for this study was time and human resource intensive. Furthermore, there were significant financial costs associated with the provision of tokens of appreciation. However, we believe these strategies assisted in achievement of the final response rate.

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[1] Chizawsky, L.L., Estabrooks, C.A., Sales, A. E. (2008). The Feasibility of Web-based Surveys as a Data Collection Tool: A Process Evaluation. Manuscript in preparation
[m] Ibid
[n] Ibid
[o] Ibid
[p] Ibid
[q] Ibid

5.0 SUMMARY OF FINDINGS

This report is largely descriptive and aims at detailing the modifications that were made to the instrument, the process of administration and validation of the ACT as well as enumerating key themes emerging from the findings.

The original ACT[r] was developed while balancing the requirements of reasonable instrument development principles and the practical realities of having to administer the tool to many participants in as short a time as feasible. In this pilot study, the ACT was modified and tested with five professional groups (nurses, allied providers, physicians, clinical specialists, and managers) in a pediatric environment in preparation for a multi-site national study.

A detailed process evaluation was undertaken to assess the data collection methods prior to the multi-site study. Our findings indicate that using the web for survey research in this population of health care participants is very effective particularly when study staff have a high profile in the field continuously providing information about the study. We believe that the use of incentives and tokens of appreciation such as $5 Tim Horton's coffee cards are influential in achieving high response rates.

The ACT is a composite measure representing eight hypothesized dimensions of organizational context: leadership, culture, evaluation, organizational slack, structural and electronic resources, information sharing interactions, information sharing activities and information sharing social processes (social capital). Five dimensions (culture, leadership, evaluation, organizational slack and information sharing social processes) were found to be internally reliable (Cronbach's α range = .708-.902).

The pilot study allowed us to conduct a preliminary evaluation of the stability of the ACT instrument factor structure in pediatric acute care. Due to sample size restrictions and decreased variance resulting from scale modifications, factor analysis for the items belonging to the culture, leadership and evaluation scales was undertaken. A three-factor solution accounting for 62% of the variance of *organizational context* resulted.

Several key themes emerging from the bivariate analyses allowed us to begin to create profiles of context and research use for each of the units. Of particular interest are the unit variation, professional group variation and the correlations. These findings are summarized below:

Unit Variation. Statistically significant differences by unit were found for six of the hypothesized organizational context dimensions: culture, leadership, evaluation, organizational slack, information sharing social processes and structural and electronic resources. Significant variation by unit was found for two of the four research utilization variables (instrumental and conceptual research utilization) indicating elements, other than context, may play a role in research utilization behaviours of healthcare professionals. Statistically significant differences across the units were found for burnout (exhaustion) and burnout (cynicism).

Professional Group Variation. Comparisons by professional group showed statistically significant differences between the five professional groups with respect to all context elements

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[r] Estabrooks, C.A., Squires, J.E., Adachi, A. M., Kong, L., Norton, P.G. (2008). Utilization of Health Research in Acute Care Settings in Alberta Technical Report. (Report No. 08-01-TR). Edmonton, AB, Faculty of Nursing, University of Alberta. (ISBN: 978-1-55195-231-4)

and with respect to research utilization (instrumental, conceptual and persuasive research utilization). Additionally, statistically significant differences across professional groups were found for job satisfaction and for burnout (exhaustion). Clinical specialists reported higher research utilization than the other professional groups for instrumental, conceptual and overall research utilization. Of the five professional groups, nurses and clinical specialists reported approximately equally highest for persuasive research utilization.

Correlations. For the entire sample, four of the eight dimensions of the ACT hypothesized to measure organizational context were positively correlated at statistically significant levels with at least two of the four types of research utilization measured. These findings suggest that better research utilization is associated with more positive perceptions of aspects of context. For the nurse group, all eight dimensions of the ACT hypothesized to measure organizational context were positively correlated at statistically significant levels with at least one of the four types of research utilization. In the allied health professional group, however, none of the hypothesized context dimensions statistically significantly correlated with research utilization.

The Alberta Context Tool: Pilot Study to Main Project 2 Study. As stated in the introduction to this report, the primary objective of this pilot study was to test the Alberta Context Tool and modify it as needed for use in the pediatric setting in preparation for a national study involving 32 units at 8 pediatric hospitals in Canada. Following data collection and analysis for the pilot several modifications were made to the instrument prior to the main project 2 study. These modifications include:

1. In consultation with a psychometrician, questions were streamlined to increase validity and reliability.

2. A decision was made to discontinue the "unable to determine" and "do not know" option as a response .

3. Questions which appeared redundant were deleted.

4. Following a feasibility study and the pilot, a decision was made not to include the Environmental Complexity Scale (ECS) in the instrument suite for the main Project 2 study. This decision was motivated by several factors, one being the length and complexity of the scale resulted in added time for participants to complete the survey and secondly there were poor correlations between the ECS subscales and the research use questions.

6.0 IMPLICATIONS AND FUTURE DIRECTIONS

The findings from the pilot study set the stage for a successful multi-site national Project 2 Study. A pediatric acute care version of the ACT is now available in 2 languages (English and French) with forms for each of the five professional groups examined in this report.

The "pilot study" is the second study in which the ACT was administered. Although there were some differences observed in the results of the two studies there are not any findings which cannot be explained. This adds validity to the ACT as an instrument which has the capability of measuring the dimensions of organizational context in the healthcare environment and detecting similarities and differences across settings.

The exclusive use of a web-based survey format for the main Project 2 study was selected based on the results of this pilot study. This is despite the fact that past research had shown lower response rates with health care professionals using a web-based survey format.[s] We believe the high response rate we achieved is attributable to the innovative recruitment procedure employed in this study.

The ACT is copyright protected and therefore is not appended to this report. Inquiries regarding obtaining a copy of the tool should be made to Dr. Carole A. Estabrooks at (780) 492-3451 or by email: carole.estabrooks@ualberta.ca

7.0 PRODUCTS

The products generated from this study to date are as follows:

Thesis completed for Masters of Nursing Degree Spring 2008
Chizawsky, L.L.K. (2008). *A Pilot Test of the Alberta Context Tool in Neonatal and Pediatric Acute Care Nurses*. University of Alberta, Edmonton, AB. (Supervisor: CA Estabrooks; Committee members: D Harley, A Sales)

Posters
Hutchinson, A.M., Estabrooks, C.A., Stevens, B. *Inter-professional interaction and context: Consequences for research use.* Knowledge Translation 2008: Forum for the Future, Banff, Alberta, June 9 – 11, 2008.

Publications (in progress)
Chizawsky, L.L., Estabrooks, C.A., Sales, A. E. The feasibility of web-based surveys as a data collection tool: A process evaluation. Manuscript in preparation. (Target: Applied Nursing Research)

Chizawsky, L.L., Estabrooks, C.A., Harley, D., Sales, A. E. Piloting the Alberta context tool in a population of neonatal and pediatric nurses. Manuscript in preparation. (Target: Nursing Research)

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[s] Feudtner, C., Santucci, G., Feinstein, J.A., Snyder, R., Rourke, M.T., & Kang, T.I. (2007). Hopeful thinking and level of comfort regarding providing pediatric palliative care: A survey of hospital nurses. *Pediatrics, 119*(1), 186-192.

Cummings, G., Scott, S., Hutchinson A., Estabrooks, C. Squires, J., Kong, L., Norton, P., Stevens, B. (authorship and order not final). The relationship between characteristics of the organizational context and research utilization in the pediatric setting. Manuscript in preparation.

Hutchinson, A.M., Kong, L., Estabrooks, C.A., Stevens, B. Interdisciplinary interactions among health care professionals, an evaluation of context and research use. Manuscript in preparation. (Target: Journal of Continuing Education in the Health Professions)