Appendices

Appendix A Example Data Collection Form

Patient Name									
	Nurse Name		**Ward**	**Hospital**	**Date**		**Recorder Name**		
Patient ITISS# Room#									
	P1	P2	P3	P4	P5	P6	Other N1	Other N2	Assistance	Observation
0:00											0:00
0:10											0:10
0:20											0:20
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Appendix B Survey Form

<div align="center">

ITISS study
Day Retrospective

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To preface the data collected by the ITISS researchers please answer the following questions:

What is the baseline nurse staffing level for this ward (# of nurses)? _____

How many nurses did you have today?_____

Based on today's patient workload, was the ward (circle your response):

      Understaffed   Appropriately staffed   Overstaffed

Did anything particularly uncommon happen today that could have influenced the care provided by nurses? If yes, please provide a brief comment.
_____
_____
_____
_____
_____
_____

Filled out by:_____
Unit: _____
Date: _____
Shift: _____

If you have any questions please contact Linda Hathout 787-1879.

Please return this form to the researchers.

Appendix C Researcher reflections on the methodology

One of the Researchers, Dustin Brad, was asked to create a series of questions regarding the research methodology and ask his fellow researchers there opinions on the adequacy of the research methodology. The following are the questions he asked and the responses from each researcher:

1. Do you feel that you received adequate training to code your observations correctly?
    → What more could be done?
2. Were the set of codes used sufficient for all observations?
    → What areas were lacking?
    → was there confusion about what codes were to be used in certain situations
    → recommendations for other codes
    → should some be combined?
3. Do you feel that making an observation every 10 minutes is an accurate means of sampling the nurses' per patient workload?
    → more or less frequent?
4. Do you feel that having to follow two nurses at a time may have compromised the methodology?
5. Are the 4 headings (direct nursing care, indirect nursing care, unit related work, and personal time) enough?
6. Do you feel that the rotation schedule between the different hospitals and wards was an appropriate method to sample normal ward activity?
7. Did the length of time at St Boniface General Hospital and Grace General Hospital do enough to enhance the validity, generalizibility, and breadth of the study?
8. Do you have any concerns over the number of data collectors present on the ward during each day?
    → Should all patients have been covered?
    → Was the method used to select which nurses patients would be followed appropriate?
9. Do you feel the form to be completed by the charge nurse at the end of the shift was enough to capture any irregularities or complexities of the past shift that would not be reflected by the observation of individual nurses?
    → Do you have any recommendations about how the form used may be improved to give a more complete picture of overall ward activity during the shifts where data was being collected?
10. Do you feel that nurses' behavior was influenced by the fact the data collectors were observing them?
    → If so, in your opinion what could be done to reduce the obtrusiveness?
11. Did any nurses express concern over the methodology used? If so, what concerns?
12. Do you feel that the privacy of patients was compromised by the study?
13. Did patients or their family express any concern over their indirect inclusion in the study?
14. Overall, what aspects of the methodology used do you feel positively about?
15. Overall, what aspects of the methodology used do you feel negatively about?
16. In your opinion, are there any limitations imposed on the study due to the methodology used?
17. What recommendations do you have to further refine this methodology?

The following are the responses of each research as collected by Dustin Brad:

Adam Kroeker
　　　He felt that for the most part, the training was sufficient to confidently code observations, although in some instances there was confusion. This usually involved the possible over usage of I-notes, where I-trans or I-disch may have been more appropriate. Certain situations such as when the nurse was checking blood test results on a computer were vague in how they should be coded. Also, a separate code for when nurses were in shift changeover meetings may have proved beneficial, as there was not total agreement among data collectors in how to code it. One idea he had to better train the researchers would be for everyone to follow the same nurse for roughly an hour on the orientation day and then compare how everyone coded each observation.
　　　As for making an observation every 10 minutes, he felt that sometimes it did not accurately capture what the nurse did during the day. Also, depending on where the researchers were situated, they might over

represent desk activities such as I-notes, I-com, or P-stand if their station for the shift was near the desk, as it often was. The four categories of possible codes were appropriate, as was the rotation schedule between wards and hospitals. However, there may not have been enough shifts at St. Boniface General Hospital and Grace General Hospital. Another 2 shifts at each may have solved this.

He responded that following 2 nurses might have compromised the methodology, as it added to the difficulty of keeping the observations totally objective on the 10-minute mark. The selection of what nurses were to be followed was not always totally random in his view. Regarding the form to be filled out by the charge nurse at the end of the shift, his opinion was that it was not given much attention and thought when completed. One idea he had was to make it more patient oriented, whether one specific patient required a lot more care than others.

Adam felt that the data collectors influenced the behavior of nurses. This does not apply to direct patient care as much as indirect care. Also, some nurses may have made sure to cut down the length of their breaks. Some nurses thought the data collectors did not note enough of the specifics of their job. He did not think that the privacy of patients had been compromised as a result of their indirect inclusion of the study. Neither patients nor their family had expressed any concern.

He thought that it might have been better to collect data on the span of time spent on each task. Another idea he had was to ask nurses more directly what their opinion of the ITISS forms where.

Kathy Rawszer

As Kathy joined the study midway through, she did not receive the full training and relied on other data collectors to learn how to code. There was some confusion on how to code certain tasks with regards to charting and organizing the actual patient binders themselves. She felt that taking observations every 10 minutes was an appropriate method, given the number of nurses and wards. Following two nurses on the day shift may have compromised the data to some degree in her opinion. It was hard to find them for a direct observation, so nurses would have to be asked what they were doing prior.

The rotation between different wards and hospitals was acceptable to her, as it covered a range of very busy and somewhat quieter institutions. However, she felt an equal amount of time should have been spent at each. She saw no need to cover all patients on a ward, but the method of choosing which nurses to follow seemed fairly random, almost arbitrary.

She felt that the nurses' behaviour was influenced by the observers, as some tried to seem a little busier than they actually were. Nurses at the Health Sciences Centre got used to the process and did not let it affect them eventually. Some nurses expressed concern to her over whether the methods would actually accomplish the goals of the study. However, this resulted more from a lack of understanding of the study than anything else. As no data collectors went into patient rooms, their privacy was not compromised. Some family members were curious about why the data collectors were on the ward, but the concerns were not negative.

Her overall feelings regarding the study were that it worked well to accomplish what it set out for. However, by not going into patients rooms, it was tough for data collectors to know what nurses were doing at the exact 10 minute mark. She suggested having a meeting for the nursing staff shortly prior to the study beginning to give them a better understanding of its methods and goals.

Blair Robinson

Blair felt that he had received adequate training to code his observations correctly, but some direct care tasks were a little ambiguous. He suggested going through an hour of observations with someone running the study. He responded that some codes might have been overused. For example, I-notes was used a lot and could have been when I-disch and I-trans should have. It was also difficult to determine exactly which patient was being talked about at an observation mark, leaving the I-com code difficult to pinpoint on one patient.

The sampling method of making an observation every 10 minutes was good in his view, but that was not always the case. Inability to track down a nurse and inconsistencies in coding between data collectors may have been a threat to a strict adherence to the methodology. When following two nurses, Blair said it was possible to lose track of either. However, this was not different from when only one was being followed. He suggested having an equivalent number of observation time at all hospitals to maximize generaliziblity. He felt that the charge nurses did not give much thought to filling out the end of shift forms, adding minimal comments. He found that some nurses went out of their way to tell the data collectors what

they were doing. Some thought we should have been keeping track of everything they had been doing. As we did not have any real interest in patient info, Blair did not think privacy was compromised.

With regards to the needs of the study, he felt that the method used was one of the best possible considered the time and budget constraints. He was not sure about the overall methodology of the study, as he did not experience the data analysis portion. One idea he suggested was to utilize computers to monitor the movement of the nurses throughout the ward.

Co-Co Qiang Chen

She said that the first few shifts were difficult because she was not sure how to code a lot of observations, but caught on very quickly. A lot of the unit related codes were not used because she did not fully understand what they were for. She also thought P-stand and P-time could be combined into one category. Instead of taking observations every 10 minutes, she thought one every 15 minutes would work better. Following two nurses was not a threat to the objectivity of the methodology in her opinion.

As Health Sciences Centre was the busiest and biggest hospital in the study, she felt that only two shifts at the other hospitals was sufficient. With regards to the end of shift form filled out by the charge nurse, there was a concern that they might not be the best to ask what the situation has been like across the entire ward. The nurses being observed continued doing their job, as they would have otherwise in her view. One nurse especially had expressed some concerns about the methodology to her. As the data collectors never went into patient rooms, she did not think there were any privacy issues.

She felt that the nursing staff could be better informed on the study, hopefully creating a more understanding and welcoming environment for the researchers. Also, she thought some of the direct nursing care could have been coded in greater detail.

Kaily Bodnarchuk

Kaily felt that the orientation was a little rushed, suggesting the addition of an hour to follow a nurse to get a feel for making and coding observations. There was confusion for the first couple days, especially deciding which code to use when more than one seemed to fit. Following two nurses on the same shift made it hard to keep up a rigorous 10 minute observing schedule. As the Grace Hospital was the quietest, she felt that the two shifts there was sufficient and it made sense to have most shifts at Health Sciences, as it was the busiest.

There was some lack of clarity regarding what methods the charge nurses actually used to assign nurses for the data collectors to follow. Also, the charge nurse forms may have been underutilized, as they were too busy to write down much on them. She mentioned the Hawthorne Effect, as it seemed that the nurses wanted to give the data collectors the results they wanted, rather than actual objective data. Also, some were a little skeptical of the purposes of the study and did not appreciate being followed, as they did not fully understand it. As all the data collectors had completed the PHIA course, she did not think patient privacy was compromised.

As for the overall methodology of the study, it appeared to be the best possible way of accomplishing the goals. However, she felt that the nursing staff was uniformed of the study, leaving the data collectors in an awkward environment. Also, the following of two nurses on the day shift may have compromised the to some degree.

Aaron Cook

Aaron felt that slightly more detailed training process would have been beneficial to the overall success of the study, especially regarding how to code situations such as handover meetings, assistance, and when nurses are covering for others who are on break. He felt that separate codes would be worthwhile for shift changeovers. In his view, more observations were needed at St. Boniface and Grace hospitals, which would have decreased the chances of statistical error.

There was a lack of understanding of how the charge nurse assigned the initial nurses to be followed. He did not think the researchers presence influenced the behavior of nurses or compromised the privacy of the patients. Overall, he thought the nursing staff should have been better informed of the study. It accomplished what it set out to find though, although he felt there was a need for a greater number of observations.

Dustin Brad summary

Most of the researcher were in agreement that more training would have been beneficial. There was initial confusion on how to actually proceed with the observations and coding. This could have been at least reduced with some actual observation time during orientation, with a discussion to follow how each data collector coded certain tasks. There was some overall confusion on how to code certain situations, with each researcher developing their own style. It was only later into the study that there was some discussion about creating an agreement in coding procedure among all data collectors. Many researcher expressed concern that certain codes, specifically I-notes may have been overused. Nearly all data collectors thought taking an observation every ten minutes was one of the most feasible methods of measuring per patient workload. Many felt that following two nurses at a time may have threatened a strict adherence to the proposed methodology, as it was not always possible to make an observation at the exact 10 minute mark.

The researcher were split on whether the shifts should have been balanced between all three hospitals or stay focused on Health Sciences Centre, as it was the busiest. However, all thought that at least some shifts at hospitals other than HSC was essential. There was a general uncertainty on what methods were employed by the charge nurse to pick which nurses and set of patients would be followed. Some thought it was totally arbitrary, while others thought the patients with the most intensive care needs were selected. With regards to the forms filled out by the charge nurse at the end of the shift, most thought they were a great supplemental aspect of the study, but were underutilized. The charge nurses either did not know specifically what the forms were for, or simply not have the time to give them the necessary attention. Nearly all the researcher thought their presence influenced the nurses' behaviour. There was agreement that because the nurses did not fully understand the methodology and intentions of the study, their actions were not totally natural. Some felt as if the researcher were there to identify weaknesses in their practice and work ethic. As such, it seemed as if they took considerable care to look busy, even when there really was nothing more they could be doing. Many nurses also expressed concerns that the methodology did not capture the true complexity of their job, as it missed many tasks that fell in between observation points. None of the researcher thought patient privacy was compromised, as they never entered rooms.

Overall, the researcher felt that the methodology used was one of the best possible means of accomplishing the goals of the study. In fact, very few could even perceive of conducting a feasible study in a different way to get a similar end result. However, a common concern was a somewhat lacking training session that left researcher with some confusion on how to code the same situation, resulting in possible inconsistencies. Also, many expressed concern that true objectivity in making observations every 10 minutes may not have been possible. Finally, the most widespread criticism was the nursing staff's lack of awareness regarding the overall intentions and methods of the study. A more open flow of information to the nurses may have created increased dialogue and understanding between the observers and the observed.

Appendix D Impressions of Ward Experience

The following summary was prepared by Kaily Bodnarchuk:

Question: Imagine a family member of yours were to be a patient on one of the wards you observed. What aspects of each ward would make you feel positive and confident about your relative's well being? What aspects of each ward would make you feel concerned or uncertain about your relative's well being?

Health Sciences Centre

Comment for Ward H4
The majority of the researchers agreed that one of the most positive aspects of Unit H4 was that the level of patient care was very high. There appeared to be very good communication between the nurses and their patients. Overall, the nurses appeared to be very friendly, professional, and approachable. On this ward, the constant presence of at least one doctor at all times was also considered by most researchers to be a very positive aspect (as should an emergency situation arise). Other observations made that were considered positive aspects of this ward included the constant presence of housekeeping staff (cleanliness very important), as well the pending construction project. Finally one researcher made note of the colourful aboriginal artwork, which could be of some comfort to patients and families of this background.
There were also some aspects of this ward that were a cause for concern for most of the researchers. One cause for concern mentioned was that this ward appeared very chaotic much of the time. Most of the researchers noted that the ward appeared to be understaffed at times, and the nurses often expressed that they were physically and emotionally exhausted. Privacy being hampered for the patient and their families was also mentioned, as typically there were four patients per room. The high observations unit on this ward was also mentioned as possibly causing other patients not in this unit to think that that their care is less important as those in high observations are constantly monitored.
One researcher commented that the fact that this ward is a teaching ward might cause some patients to feel de-humanized, as their health information is often spoken of so open and freely. Another researcher made comment of what was thought to be an unusual occurrence on a night shift, when one of the nurses being shadowed slept for three hours. During this time, the nurse's patients were not checked on. On another occasion, the same researcher noted that there was some confusion regarding which nurse was watching a particular patient, and as a result a patient was left unchecked for sometime.

Comment for Ward D4
Most of the researchers agreed that although this ward was typically quite busy, the nurses were able to handle the stress and maintain a positive attitude. The constant presence of at least one doctor was also mentioned as comforting (in case of an emergency). The pamphlets on the walls informing patients and families, as well as the plaques and certificates of appreciation were also noted as being of comfort.
Some causes for concern mentioned included that the ward halls were very cluttered, and some of the plastic note holders were broken and often left open (further adding to the feeling of clutter). One researcher pointed out that this could cause accessibility problems during an emergency. At times there was a feeling of disorganization, the call sound was noted as being left ringing for extended periods, and it seemed as though patients were always going for tests, or being transferred.

Comment for D5
The nursing staff on this ward was noted as being especially warm, patient and compassionate towards patients and their families. The nursing staff appeared to communicate very well with the patients, even with those patients who were confused. Despite a few wandering patients, the ward appeared to be very well organized.
Some causes for concern that were mentioned included the issue of wandering patients. Sometimes wandering patients were not appropriately watched and these patients sometimes fell, or entered other patient's rooms. The lack of monitoring was likely due to the fact that each nurse was assigned to six or more patients during a shift. As well, at times the smells were very bad, likely due to soiled linens and diapers. Two researchers also made note of patients being left for extended periods of time with soiled diapers and linens.

St.Boniface General Hospital

Comment for B4
      Overall, the majority of researchers thought that this ward was very well organized and appropriately staffed. The nursing staff was noted as being very pleasant, friendly, and quickly responded to patient calls and requests most of the time. Communication between the patients and nurses was observed to be quite good, as most nurses took the time to comfort confused and frightened patients. The researchers also thought that keeping patients information behind the front desk instead of in easily accessible plastic cupboards along the walls (as they are at HSC) respected patient privacy much better.
      In regards to the question of what aspects of the ward caused concern, comments were few, but it was mentioned that at times patients were left unchecked or isolated from others for extended periods of time. As well, at other times, it was observed that some patients who wandered the hallways were not monitored as closely as they maybe should have been.

Comment for B5
      On this ward, the researchers observed that the unit was very clean and orderly. The nurses were noted as taking the time to speak with patient's families about the patient's health, and any upcoming treatments or surgery. The researchers felt that the nurses went out of their way to console some distraught and concerned families.
      Causes for concern were few, however the majority of researchers felt that the nursing staff on this ward appeared to be less approachable, and the cohesion between the nurses was not very good (disagreements occurred regarding a patient, and a very tense atmosphere resulted on one occasion). As well, one researcher felt that the privacy of the patient that the nurses were arguing about was in jeopardy at the time.

Comment for E5
      Overall, the researchers felt that this ward was very well organized, clean, and free from clutter. The halls, and patient rooms were very spacious, and it was thought that this increased patient and family privacy. The nursing staff on the whole was also noted as being very friendly, relaxed and sensitive to patient and family concerns.
      Causes for concern were few, however most researchers felt that the patient/family lounge area was too exposed, and did not provide enough privacy. One researcher also made comment regarding the delay in answering patient calls at times.

Grace Hospital

Comment for N3
      On the whole, the nursing staff was observed to be very friendly and pleasant. The ward was noted as being very spacious and free from clutter. The patient/family lounge was very spacious and comfortable, providing ample privacy at the end of the hallway. The unit desks were divided such that nurses could do their paperwork near their patients (easily monitor patients). As well, patient confidentiality was respected (records kept behind the front desk). The researchers did note any significant causes for concern on this ward.

Comment for N5
      Comments were few, however most of the researcher thought this ward had some of the nicest nurses they had observed. The staff was very friendly, and took the time to listen to patient and family concerns, even when things got very hectic and stressful. Patient confidentiality was also respected (patient charts kept behind front desk).
      One cause for concern on this ward that was noted was that at times, patients would cry out loudly and often, and there appeared to be little attempt to solve this problem. On one shift, a crying patient in the isolation room was left unchecked for sometime as well.

Comment for W3

The nursing staff on this ward was very friendly, and appeared to really enjoy their work. Even when times were stressful, the nurses remained cheerful. There was a definite sense of cohesion and support of one another on this ward. The ward was observed as being very clean, orderly and free from excess clutter. As with N5 and N3, patient confidentiality was maintained by keeping patient records behind the front desk.

Causes for concern on this ward were few, however, one researcher felt that there could have been more nurse's aids to assist with handing out meals and other tasks typically performed by the aides (would allow the nurses more time to prepare meds, research information on patients).

Summary of the Overall Impression of Each Hospital

Health Sciences Centre

The overall atmosphere of the Health Sciences Centre was very busy, and at times very chaotic. However, this was to be expected due to the fact that it is a teaching hospital and serves a large urban area. In regards to staffing, nursing staff on wards H4, D4, and D5 were on the whole very positive, warm and friendly. However even they expressed that they were very stressed out at times, especially on H4 and D4, adding to the feeling of disorganization.

St. Boniface General Hospital

Overall, the majority of the researchers agreed that St. Boniface felt very well organized, and much less chaotic than Health Sciences Centre. The wards were generally more spacious, and accommodating to patient's families. In regards to staffing, the nurses were for the most part very pleasant and spent a lot of time comforting and talking to patients and their families. However, a few of the researchers commented on some nurses who appeared unapproachable (this may have been due to the researchers observing them and not fully understanding the methodology). In regards to patient care, the majority of the researchers said that they would feel most comfortable having a family member stay in St. Boniface General Hospital.

Grace Hospital

This hospital was noted as being the quietest out of the three, and the atmosphere was much more relaxed. For the most part, the wards observed were very well organized and uncluttered. There also appeared to be more of a sense of cohesion between the nurses, who were for the most part very warm and friendly. The staff at this hospital also seemed much more relaxed than the staff at HSC and St. Boniface (likely due to the type of patients at this hospital).

Appendix E Multiple regression analysis of ITISS elements

Variables
1. Observed Time Spent
    1. Total Time   (OBSTOTAL)
    2. Direct Care Time   (OBSD)

2. iTISS elements (1-present, 0- absent)
    1. T1 - T68 are medical interventions
    2. T69 - T74 are indirect or other interventions

Sample Size (N)
    HSC - 171
    STB - 88
    GRA -101

Methodology

1. Calculate the number of iTISS elements present and correlate with the OBSTOTAL and OBSD.

2. The sample is split into three groups as ff:
    a. HSC as the development group
    b. STB and GRA as the two validation groups

3. For the development group, the following strategies were done:
    a. Fit a multiple regression to determine the relative weights of each iTISS element to the dependent variable
        i. Dependent variable is OBSTOTAL and T1-T74 interventions as the independent variable
        ii. Dependent variable is OBSD and T1-T68 interventions as the independent variable

    b. Two ways to calculate the relative weights
        i. Sum up the regression coefficients b_i and get the ratio of each b_i to the Total b_i.
        ii. Sum up the TypeII SS which is the SS of each effect adjusted to all other effects in the model and get the ratio of each effect SS to the Total SS.

    c. Once the relative weights are calculated, convert them into integer values.
    d. Sum up the relative weights to get the TOTAL ITISS SCORE.
    e. Correlate the TOTAL ITISS SCORE and OBSTOTAL.

4. For the validation groups,   use the relative weights found in the development group to obtain TOTAL ITISS SCORE and then correlate it with the OBSTOTAL and OBSD.

Results

1. The correlation coefficient between the Number of iTISS vs OBSTOTAL = 0.43 (Pr=<.0001)
   Correlation coefficient between Number of iTISS vs OBSD = 0.44 (Pr=<.0001) The
   relationship between the variables did not show a strong relationship.

2. Development group - The multiple regression analysis excluded the iTISS elements with
   zeroes in all of the observations.   There were also cases where two or more elements have
   exactly the same data resulting to misleading and biased estimates because the solutions for the
   parameters are not unique. In those cases, only one of them is included in the analysis.
   Example of these cases are the T30=T31, T38=T39.

3. The R-square result is 0.6797 for the model with the dependent variable OBSTOTAL and 35
   independent variables. On the other hand, when the dependent variable is OBSD and 31
   independent variables are run, the R-square is 0.6226.   These results have improved the
   relationship to OBSTOTAL and OBSD.

4. The regression estimates are combination of positive and negative coefficients. Higher
   coefficients (e.g. T9, T39) were observed on iTISS elements that occurred only once or twice
   in the sample. When these interventions included the predicted OBSTOTAL (or OBSD)
   increases greatly.   There seem to be that these results are not consistent with the actual degree
   of difficulty and time spent in doing the tasks.

5. In addition, there is a problem of calculating the ratio of each estimate with the Total estimates
   because of the presence of the negative coefficients. If only we can force the coefficients to be
   always positive, maybe we can have different results but SAS has no option for that.

6. The alternative is to calculate the relative weight of each ITISS element effect using the
   TYPEII SS.   Using these relative weights, a new set of ITISS Scores for each observation are
   calculated. T39 and T59 gave the highest relative weights. These results again do not make
   sense.   The relationship between the new ITISS Score and OBSTOTAL is 0.304.

7. Validation Groups using the relative weights from the development group, a new set of ITISS
   Scores for each observation are calculated separately for the GRA and STB group. The
   correlation coefficient is 0.408.

8. Best-fit results

```
WHRA Medicine Program Model 3 - Max Rsquare

The REG Procedure Model: MODEL1

Dependent Variable: Obstotal  Obstotal

Number of Observations Read          171
Number of Observations Used          171

Analysis of Variance
                               Sum of          Mean
Source                 DF      Squares         Square     F Value    Pr > F

Model                  35     6526.68836      186.47681      8.18     <.0001
Error                 135     3075.87564       22.78426
Corrected Total       170     9602.56400

Root MSE            4.77329    R-Square     0.6797
Dependent Mean     13.72932    Adj R-Sq     0.5966
Coeff Var          34.76709
```

Variable	Label	DF	Parameter Estimate	Standard Error	t Value	Pr > |t|	Type I SS	Type II SS	Standardized Estimate
Intercept	Intercept	1	17.938	9.911	1.810	0.073	32233	74.630	0.000
T4	T4	1	-0.791	3.568	-0.220	0.825	5.821	1.119	-0.011
T9	T9	1	22.193	7.909	2.810	0.006	2126.930	179.391	0.318
T10	T10	1	-1.979	3.360	-0.590	0.557	1.594	7.908	-0.035
T11	T11	1	1.279	1.193	1.070	0.286	374.652	26.178	0.083
T12	T12	1	1.878	1.432	1.310	0.192	287.817	39.177	0.075
T17	T17	1	7.509	5.095	1.470	0.143	162.279	49.503	0.108
T21	T21	1	-0.871	1.186	-0.730	0.464	67.614	12.277	-0.047
T27	T27	1	-1.356	1.148	-1.180	0.240	30.938	31.806	-0.084
T28	T28	1	4.022	3.132	1.280	0.201	327.464	37.581	0.081
T31	T31	1	8.121	8.171	0.990	0.322	407.581	22.506	0.083
T32	T32	1	0.964	1.565	0.620	0.539	27.569	8.644	0.039
T35	T35	1	0.846	1.022	0.830	0.409	0.031	15.637	0.047
T39	T39	1	28.761	5.101	5.640	<.0001	727.963	724.395	0.293
T40	T40	1	0.284	1.129	0.250	0.802	2.464	1.445	0.018
T42	T42	1	4.591	2.434	1.890	0.061	197.331	81.078	0.113
T43	T43	1	1.665	1.758	0.950	0.345	0.615	20.441	0.055
T46	T46	1	2.459	1.247	1.970	0.051	309.164	88.592	0.161
T47	T47	1	1.749	2.174	0.800	0.422	270.372	14.755	0.057
T49	T49	1	2.356	1.572	1.500	0.136	165.295	51.181	0.103
T50	T50	1	4.263	3.524	1.210	0.229	28.085	33.348	0.075
T52	T52	1	-2.601	1.542	-1.690	0.094	46.601	64.843	-0.095
T53	T53	1	-2.284	2.552	-0.890	0.373	4.247	18.238	-0.051
T55	T55	1	2.467	3.101	0.800	0.428	1.110	14.422	0.043
T56	T56	1	12.266	5.538	2.220	0.028	168.525	111.787	0.125
T58	T58	1	10.977	2.472	4.440	<.0001	448.413	449.431	0.290
T59	T59	1	1.570	1.758	0.890	0.373	23.742	18.188	0.057
T60	T60	1	0.320	1.001	0.320	0.750	0.416	2.326	0.018
T61	T61	1	5.537	2.129	2.600	0.010	234.165	154.131	0.181
T64	T64	1	-4.515	5.271	-0.860	0.393	22.448	16.722	-0.046
T65	T65	1	1.190	2.286	0.520	0.604	5.398	6.176	0.034
T67	T67	1	-0.147	4.880	-0.030	0.976	0.019	0.021	-0.002
T69	T69	1	0.549	5.292	0.100	0.918	5.686	0.246	0.006
T70	T70	1	-2.088	1.898	-1.100	0.273	20.926	27.590	-0.076
T72	T72	1	-5.692	10.072	-0.570	0.573	10.290	7.277	-0.170
T73	T73	1	-7.657	10.089	-0.760	0.449	13.124	13.124	-0.216

Appendix F ITISS Element Distribution

ITISS Element	GRA-N3	GRA-N5	GRA-W3	HCS-D4	HSC-A4	HSC-B3	HSC-D5	HSC-H4	STB-B4	STB-B5	STB-E5	Grand Total	Average Frequency

#													
1	0.56%	0.63%	0.00%	1.24%	1.75%	0.00%	0.43%	2.53%	0.00%	0.94%	1.76%	2.53%	0.89%
2	1.67%	2.50%	0.77%	4.75%	4.28%	3.70%	2.17%	6.15%	1.99%	3.59%	5.79%	6.15%	3.40%
3	0.00%	0.00%	0.00%	0.68%	0.66%	0.00%	0.00%	1.10%	0.00%	0.00%	0.25%	1.10%	0.24%
4	1.11%	0.00%	1.54%	2.71%	3.18%	0.00%	0.43%	3.08%	0.00%	0.31%	0.50%	3.18%	1.17%
5	0.00%	0.00%	0.00%	0.34%	0.00%	0.00%	0.00%	0.22%	0.00%	0.00%	0.00%	0.34%	0.05%
6	12.22%	0.63%	14.62%	0.56%	2.08%	37.04%	0.43%	1.32%	0.00%	0.16%	0.50%	37.04%	6.32%
7	1.67%	0.00%	6.15%	5.54%	6.69%	3.70%	0.87%	2.53%	1.00%	1.09%	2.02%	6.69%	2.84%
8	0.56%	0.63%	4.62%	8.59%	14.58%	7.41%	3.48%	7.25%	0.50%	4.38%	3.53%	14.58%	5.05%
9	3.89%	5.00%	1.54%	14.35%	8.77%	7.41%	1.30%	10.66%	0.00%	5.78%	7.56%	14.35%	6.02%
10	10.56%	7.50%	11.54%	18.53%	17.43%	3.70%	1.74%	27.03%	6.47%	15.16%	26.95%	27.03%	13.33%
11	97.78%	94.38%	88.46%	95.82%	96.38%	92.59%	75.65%	94.18%	99.50%	97.03%	97.23%	99.50%	93.55%
12	2.78%	5.00%	2.31%	13.22%	15.02%	11.11%	9.13%	15.38%	6.47%	17.03%	15.87%	17.03%	10.30%
13	0.56%	1.88%	0.77%	0.79%	0.55%	0.00%	0.00%	0.77%	0.00%	0.31%	0.25%	1.88%	0.53%
14	0.00%	0.00%	0.00%	0.23%	0.33%	0.00%	0.00%	0.00%	0.50%	0.00%	0.00%	0.50%	0.10%
15	0.00%	0.00%	0.77%	0.11%	0.11%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.77%	0.09%
16	0.56%	0.00%	2.31%	0.23%	0.00%	0.00%	0.00%	0.00%	0.00%	0.47%	0.25%	2.31%	0.35%
17	3.89%	2.50%	0.77%	4.29%	3.40%	0.00%	0.87%	4.62%	0.50%	2.03%	3.27%	4.62%	2.38%
18	0.00%	0.63%	0.00%	1.69%	0.88%	0.00%	0.00%	1.65%	0.00%	0.16%	0.76%	1.69%	0.52%
19	1.11%	1.25%	0.00%	1.24%	1.75%	0.00%	0.43%	0.66%	1.00%	2.03%	1.76%	2.03%	1.02%
20	0.56%	0.00%	0.77%	0.00%	0.88%	0.00%	0.00%	0.66%	0.00%	0.63%	0.50%	0.88%	0.44%
21	58.33%	48.75%	49.23%	42.60%	49.01%	29.63%	16.52%	49.67%	25.87%	43.91%	47.10%	58.33%	41.88%
22	1.11%	1.25%	0.77%	1.02%	1.10%	3.70%	0.87%	1.43%	0.50%	0.78%	0.50%	3.70%	1.18%
23	0.00%	0.00%	0.00%	0.00%	0.22%	0.00%	0.00%	0.00%	0.00%	0.31%	0.00%	0.31%	0.05%
24	1.67%	0.00%	1.54%	0.11%	1.32%	0.00%	1.30%	1.10%	0.00%	0.78%	1.01%	1.67%	0.80%
25	0.00%	0.63%	0.77%	0.11%	0.77%	0.00%	0.00%	0.33%	0.00%	0.78%	0.00%	0.78%	0.31%
26	0.00%	0.63%	0.77%	0.56%	1.43%	0.00%	1.74%	1.21%	0.50%	0.94%	2.27%	2.27%	0.91%
27	98.89%	95.00%	87.69%	97.74%	98.68%	92.59%	82.17%	98.68%	59.20%	51.25%	63.98%	98.89%	84.17%
28	0.56%	0.63%	2.31%	2.03%	0.77%	0.00%	0.00%	1.32%	8.96%	37.66%	57.68%	57.68%	10.17%
29	2.22%	1.25%	0.77%	0.90%	2.08%	3.70%	0.00%	1.32%	0.00%	1.56%	1.01%	3.70%	1.35%
30	0.00%	1.88%	2.31%	7.34%	2.52%	0.00%	0.43%	6.92%	1.49%	28.28%	7.81%	28.28%	5.36%
31	1.67%	3.13%	0.77%	4.07%	3.40%	0.00%	3.48%	3.96%	0.50%	1.88%	3.78%	4.07%	2.42%
32	0.56%	2.50%	0.00%	3.84%	6.03%	3.70%	6.52%	4.18%	0.00%	2.34%	4.03%	6.52%	3.06%
33	0.00%	0.00%	0.00%	0.23%	0.55%	0.00%	0.00%	0.22%	0.00%	0.78%	1.26%	1.26%	0.28%
34	0.00%	0.00%	0.00%	0.00%	0.66%	0.00%	0.00%	0.22%	0.00%	0.00%	0.25%	0.66%	0.11%
35	37.22%	38.75%	29.23%	27.57%	28.18%	7.41%	12.17%	31.54%	14.43%	23.44%	24.69%	38.75%	24.97%
36	0.00%	0.00%	0.00%	2.71%	2.52%	0.00%	3.48%	1.43%	0.50%	1.09%	2.77%	3.48%	1.32%
37	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.22%	0.00%	0.47%	1.01%	1.01%	0.15%
38	0.00%	0.00%	0.00%	0.90%	0.22%	0.00%	0.00%	0.55%	0.00%	1.41%	10.58%	10.58%	1.24%
39	12.78%	10.63%	20.00%	16.72%	10.96%	0.00%	3.91%	17.47%	21.89%	25.94%	56.68%	56.68%	17.91%
40	45.00%	49.38%	33.85%	68.70%	69.30%	40.74%	23.04%	68.90%	30.35%	74.38%	39.55%	74.38%	49.38%
41	0.00%	0.00%	0.77%	10.17%	9.32%	7.41%	3.48%	8.68%	2.99%	5.63%	5.04%	10.17%	4.86%
42	7.78%	8.13%	9.23%	14.46%	13.82%	3.70%	8.70%	22.75%	19.90%	19.69%	22.67%	22.75%	13.71%
43	31.11%	27.50%	21.54%	8.81%	15.02%	0.00%	2.17%	15.38%	9.45%	17.50%	15.62%	31.11%	14.92%
44	34.44%	51.88%	5.38%	13.33%	6.14%	11.11%	4.78%	8.02%	1.00%	9.53%	8.06%	51.88%	13.97%
45	1.67%	3.75%	4.62%	13.45%	16.23%	3.70%	3.91%	15.27%	0.50%	5.31%	4.79%	16.23%	6.65%
46	88.89%	77.50%	57.69%	82.82%	82.68%	55.56%	29.57%	81.98%	52.24%	79.53%	85.64%	88.89%	70.37%
47	3.89%	1.25%	3.85%	17.06%	16.45%	7.41%	1.74%	21.43%	2.49%	18.91%	20.91%	21.43%	10.49%
48	0.00%	0.00%	0.00%	1.13%	0.44%	0.00%	0.00%	0.22%	0.50%	0.31%	0.00%	1.13%	0.24%
49	25.00%	25.00%	19.23%	26.67%	26.32%	3.70%	6.52%	25.60%	7.46%	21.72%	23.17%	26.67%	19.13%
50	8.89%	10.00%	6.92%	13.11%	12.17%	0.00%	0.43%	14.40%	0.50%	10.16%	11.84%	14.40%	8.04%
51	0.00%	0.00%	0.00%	0.11%	0.22%	0.00%	0.00%	0.11%	0.00%	0.16%	0.00%	0.22%	0.05%
52	11.67%	11.25%	20.77%	6.78%	8.99%	22.22%	10.00%	8.46%	8.96%	9.06%	9.32%	22.22%	11.59%
53	5.00%	3.13%	2.31%	6.10%	9.21%	7.41%	4.78%	5.27%	1.99%	6.41%	8.82%	9.21%	5.49%
54	3.33%	0.00%	3.85%	1.02%	1.54%	3.70%	0.87%	1.76%	1.49%	0.78%	1.51%	3.85%	1.80%
55	11.11%	20.00%	10.77%	5.08%	8.66%	14.81%	8.26%	13.52%	18.91%	15.31%	11.34%	20.00%	12.52%
56	0.00%	1.88%	0.00%	3.84%	1.10%	3.70%	0.43%	1.32%	0.50%	1.25%	0.50%	3.84%	1.32%
57	1.11%	0.00%	0.77%	0.56%	0.33%	0.00%	0.00%	0.66%	0.00%	7.97%	0.00%	7.97%	1.04%
58	19.44%	15.00%	7.69%	23.28%	28.51%	14.81%	2.61%	29.12%	5.97%	27.03%	20.65%	29.12%	17.65%
59	29.44%	23.75%	11.54%	36.84%	30.48%	25.93%	3.91%	32.86%	7.96%	29.84%	27.96%	36.84%	23.68%
60	22.22%	10.63%	16.15%	21.36%	19.41%	33.33%	23.04%	20.55%	16.92%	23.13%	46.10%	46.10%	22.98%
61	0.00%	0.00%	0.77%	5.54%	4.93%	3.70%	3.91%	5.27%	6.97%	6.41%	8.06%	8.06%	4.14%
62	1.67%	1.25%	0.00%	0.11%	0.22%	0.00%	0.87%	1.21%	0.50%	0.47%	0.25%	1.67%	0.60%
63	0.00%	0.00%	0.00%	0.00%	0.33%	0.00%	0.00%	0.44%	0.00%	0.16%	0.00%	0.44%	0.08%
64	1.11%	2.50%	0.00%	3.39%	1.97%	3.70%	2.17%	1.87%	4.48%	3.91%	1.76%	4.48%	2.44%
65	5.00%	2.50%	1.54%	6.21%	4.93%	7.41%	4.78%	5.05%	2.99%	5.63%	6.30%	7.41%	4.76%
66	3.33%	0.63%	1.54%	4.75%	0.77%	3.70%	0.00%	1.21%	0.50%	2.81%	2.27%	4.75%	1.95%
67	5.00%	3.13%	0.77%	2.03%	1.86%	0.00%	0.00%	3.30%	0.00%	2.50%	2.77%	5.00%	1.94%
68	3.89%	1.25%	2.31%	2.03%	1.54%	3.70%	0.00%	1.87%	0.00%	1.41%	1.26%	3.89%	1.75%
69	0.56%	4.38%	8.46%	1.47%	1.75%	3.70%	0.00%	1.32%	0.00%	2.19%	0.50%	8.46%	2.21%
70	97.22%	80.00%	93.85%	84.63%	95.29%	81.48%	96.96%	85.82%	97.01%	91.41%	98.74%	98.74%	91.13%
71	4.44%	9.38%	9.23%	14.01%	17.00%	3.70%	4.78%	20.44%	11.44%	10.00%	9.07%	20.44%	10.32%
72	98.89%	98.13%	96.15%	85.20%	97.04%	96.30%	97.39%	92.86%	98.51%	99.69%	98.74%	99.69%	96.26%
73	1.11%	5.63%	12.31%	17.74%	15.13%	3.70%	6.52%	25.60%	7.46%	3.28%	7.56%	25.60%	9.64%
74	0.00%	0.00%	0.00%	3.50%	0.44%	0.00%	0.00%	5.82%	1.00%	0.78%	1.51%	5.82%	1.19%

Legend:
0.00% <=1%
90.00% >=90%

Appendix G Distribution of daily ITISS scores

Number of scores	65926
Mean	8.147999
Kurtosis	2.724762
Skewness	1.262926