THE VALIDITY OF SASKATCHEWAN PRIORITY SCORES

REVISED DRAFT FINAL REPORT

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PURPOSE

This document provides an initial analysis of the validity of a set of priority scores designed to assess patient urgency for scheduled surgical services in Saskatchewan. Validation is the process of evaluating the degree to which the available evidence supports the interpretability, appropriateness, and usefulness of the priority score as a measure of patient urgency.

METHODS

The priority scores are derived from 12 assessment forms or tools: 3 developed by the Western Canada Waiting List (WCWL) – hip and knee replacement, cataract, and general surgery – and 9 Saskatchewan tools adapted from the WCWL general surgery tool. These include orthopedic, gynecology/obstetrics, urology, otolaryngology, plastic, oral/maxillofacial (OMFS), neurosurgery, thoracic, and vascular surgery. Two of the Saskatchewan tools, neurosurgery and vascular, produce more than one condition-specific priority score. The analysis includes a comparison of the content of each priority score, a comparison of two methods of scoring, and the external validity of the priority scores. The two methods of scoring include:

- The priority criteria score (PCS) or weighted sum of the priority criteria items
- A combination of the PCS and procedure-specific urgency profiles, which includes an urgency profile of 80 – 100 for patients with a confirmed or suspected diagnosis of cancer. In this report, this priority score is referred to as the SASKCOR adjusted.

Validity Framework

The evaluation of the validity of the priority scores is based on the assumption that the scores are intended to compare patients within specialties rather than across specialties. External validity examines both convergent validity evidence (correlation of priority

scores with other urgency measures) and known group differences validity evidence (the ability of the priority scores to differentiate between groups expected to differ on urgency). Validity questions were:

- Is the item content relevant and representative of the underlying construct?
- Are the items clear and unambiguous?
- Does the urgency profile in combination with the PCS improve the validity of the priority scoring system?
- What is the correlation of the priority scores with other measures of urgency?
- Is there congruence between the target waiting times and surgeon-rated maximum acceptable waiting times (MAWT)?
- Do the priority scores differentiate between cancer and non-cancer patients?

Measures of urgency used to test the convergent validity of the priority scores were:

- A visual analogue scale of urgency (VAS Urgency) from 0 (least urgent) to 10 (most urgent)
- Maximum acceptable waiting time (MAWT) in weeks
- Urgency categories for Saskatoon and Regina

A variable that identified suspected or confirmed cancer cases vs. non-cancer cases was used to test the ability of the priority scores to differentiate between cancer vs. non-cancer cases.

The analysis of priority scores is based on cases from the SSCN Surgical Patient Registry who were booked from January 2004 to October 2004. Data analysis included descriptive statistics, graphs, t-tests, and correlational analysis. A more in-depth analysis of six priority scores (general surgery, orthopedic surgery, gynecology/obstetrics, urology, otolaryngology, and plastic surgery) included an examination of urgency profiles for the most common procedures, a factor analysis, and an examination of outliers (defined as cases that ranked in the most urgent 25% with the VAS urgency and in the least urgent 25% with the SASKCOR adjusted).

RESULTS

Results were based on 32,527 cases who were either waiting (45%) or who were post surgery (55%). The highest percentage of children and adolescents were seen in otolaryngology and OMFS. The percentage of cases with proven or suspected cancer assessed with each tool ranged from 0% to 90%.

Content

- The content includes three broad categories: health-related quality of life (HRQL), life expectancy, and other (history, results of physical examinations and tests, and diagnosis).
- All of the tools assess HRQL with proportions of the total weighted priority score ranging from 11% to 90%.
- Aspects of life expectancy are included in most but not all of the tools; proportions of the total weighted priority score range from 0% to 56%. Although the thoracic measure does not include life expectancy items, 90% of the cases were identified as cancer cases.
- Expected improvement with the procedure is included in most but not all of the tools.
- Social factors are included in five tools.
- Although the tools measure many of the same attributes, there are slight variations in item wording across many of the tools.
- The questions assessing symptoms or suffering include an array of attributes across the tools – physical and psychological symptoms, signs, test results, and economic factors.
- In the gynecology/obstetrics, orthopedic, and otolaryngology tools, there is some overlap in the content of items related to the frequency and intensity of symptoms.
- Some of the vascular priority scores include emergency conditions.

The Scoring Model

- For most but not all of the scores, the addition of the urgency profile to the PCS (i.e., SASKCOR adjusted) shifted the distribution upwards (i.e., more urgent).
- Distributions of the priority scores varied across the measures. For example, an individual with a SASKCOR adjusted of 55 would be in the 25% most urgent group for plastic surgery and in the 25% least urgent group for neurosurgery (spine). Because the scores are linked to a common scale of target waiting times, the two cases would have the same target waiting time regardless of the priority scale used to generate the score.

Analysis of 6 priority scores (General Surgery, Orthopedic Surgery, Gynecology/Obstetrics, Urology, Otolaryngology, and Plastic Surgery)

- Urgency profiles for high and low urgency procedures were generally consistent with a higher and lower median VAS urgency score, respectively.
- Five of the six measures had more than one factor. Generally, life expectancy items and HRQL items were weakly related and loaded on separate factors.
- Cases were identified whose SASKCOR adjusted was below the 25^{th} percentile (i.e., ranked in the lowest 25% of cases) and whose VAS Urgency was above the 75^{th} percentile (i.e., ranked in the most urgent 75% of cases). Inaccurate coding, data entry errors, or measurement errors could be possible explanations. However, it is important to identify these cases and explore the reason for the discrepancy.
- Correlations between the PCS and SASKCOR adjusted ranged from 0.43 (orthopedics) to 0.65 (otolaryngology). Thus, approximately 18% to 42% of the variance in the SASKCOR adjusted can be explained by the PCS.

External validity

- Most convergent correlation coefficients were similar using the PCS and the SASKCOR adjusted.

- Convergent correlations between the priority scores and VAS urgency were positive, as expected, with the exception of the thoracic priority score and two of the vascular priority scores, aortic aneurysm and carotid endarderectomy. The three scores were characterized by a limited range of scores of higher urgency and conditions that had life-expectancy implications.
- Convergent validity correlations between the priority scores and VAS Urgency were 0.5 or stronger for 10 of 17 (PCS) and 7 of 17 (SASKCOR adjusted) priority scores.
- Correlations between the priority scores and MAWT were negative, as expected, and 0.4 or stronger for 10 of 17 of the priority scores for both the PCS and SASKCOR adjusted.
- Correlations between the priority scores and urgency categories were positive.
- Both the PCS and the SASKCOR adjusted showed a higher mean score for cancer than for non-cancer patients (except thoracic with 90% of cases coded as cancer).
- The SASKCOR adjusted resulted in the greatest differentiation between cancer and non-cancer cases as cancer cases have an urgency profile of 80 – 100.

CONCLUSIONS AND RECOMMENDATIONS

The conclusions and recommendations contained herein represent the consensus of opinion of the members of the SSCN and WCWL Research and Evaluation Working Group following a review and discussion of the results.

Conclusions

1. Overall, the findings support the validity of the PCS and the SASKCOR adjusted for most of the priority scores, but results are not consistent for all of the scores.
2. Because priority scores have different distributions and are based on content and weights specific to each score, individual priority scores are more interpretable when compared to priority scores generated with the same measures. This is consistent with the underlying assumption that priority scores are intended to compare patients within specialties rather than across specialties.

3. The PCS and the SASKCOR adjusted show similar convergent correlations with the VAS Urgency and MAWT for most of the tools. However, it is not clear which of the scoring methods is a more accurate reflection of patient urgency.
4. Urgency profiles ensure that patients having procedures that are considered high urgency (e.g., suspected or proven cancer cases, myringotomy with tubes, aortic aneurysm) have target waiting times consistent with the urgency.

Recommendations

1. There is sufficient support for the validity of the priority scores to move forward with the implementation of 9 tools: hip and knee replacement, cataract, general surgery, orthopedics, gynecology/obstetrics, urology, plastic survey, OMFS, and neurosurgery (head and spine).
2. Three tools need review and possible revision: otolaryngology, neurosurgery, and vascular.
3. Consistent wording for common questions should be considered.
4. A user guide with definitions for each criterion would support a consistent interpretation of priority criteria items.
5. The validity evidence presented in this report is an important first step but it is recommended that the evaluation and monitoring of the validity and usefulness of priority scores continue after the priority scores and target waiting times are implemented in practice.

THE VALIDITY OF SASKATCHEWAN PRIORITY SCORES

PURPOSE

This document provides an initial analysis of the validity of a set of priority scores designed to assess patient urgency for scheduled surgical services in Saskatchewan. Priority scores are intended to be used to guide decisions about the relative urgency and order of treatment among patients on waiting lists for scheduled procedures (1-3). Another use is to provide case-mix descriptions of patients on waiting lists.

BACKGROUND

In 2001 the Government of Saskatchewan released an Action Plan for Saskatchewan Health Care that outlined a commitment to ensure more reasonable, fair, and predictable surgical waiting times for Saskatchewan residents (4). Key elements of the plan included the establishment of the Saskatchewan Surgical Care Network (SSCN) as an advisory body to Saskatchewan Health, a Surgical Patient Registry, and the development of a consistent patient assessment process. The SSCN's aim is to ensure appropriate and timely surgical care for Saskatchewan residents. The Surgical Patient Registry is a data repository of the relevant priority and surgical data for all patients undergoing surgery in Saskatchewan.

The patient assessment process consists of three components. The first component is the development of priority criteria forms (or tools), which are forms filled out by the surgeon in order to assess the urgency of the patient's need for surgery. Each item in the tool is assigned points and a final priority criteria score (PCS) is tabulated from the addition of these points. For symptom items with multiple parts, only the points for the answer with the maximum value are counted in the final score. In addition to three priority criteria tools developed by the Western Canada Waiting List (WCWL) project

(general surgery (5;6), hip and knee replacement surgery (7), and cataract surgery (8)), the SSCN developed 9 priority tools to cover all of the surgical services. These tools were adapted from the WCWL General Surgery tool. This analysis focuses on the Saskatchewan tools and includes the WCWL tools for comparative purposes. Two of the tools, Neurosurgery and Vascular, consist of a set of common questions, with condition-specific questions for different procedures. Neurosurgery includes 5 common questions and one to two specific questions for head and spine. Vascular surgery includes 5 common questions and one to two specific questions for 6 procedure groups. All of the priority scores are listed in Table 1. The Cardiac Surgery tool developed by the Ontario Cardiac Care Network was used for cardiac procedures but is not included in the analysis (9).

The second component of the patient assessment process is the procedure-specific band, referred to as an urgency profile. This is a set of minimum and maximum values (between 1 and 100) that have been assigned to each procedure. For example, a cholecystectomy has an urgency profile of 25 – 100. The PCS is transformed to a value in this range to generate an urgency score, referred to as a SASKCOR adjusted in this document.

The third component is the target time frame, developed by the SSCN and its Surgical Services Subcommittee, in consultation with doctors and specialists. Target time frames are performance goals, designed to allow the surgical care system to better monitor and track patients and help to ensure they receive care according to their level of need. To determine the target time frames, the SASKCOR is mapped onto one of six priority levels that determine the target time frame for surgery (see Table 2).

Table 1 List of WCWL and Saskatchewan Priority Scores

PRIORITY SCORES
Hip and Knee Replacement (WCWL)
Cataract (WCWL)
General Surgery (WCWL)
Orthopedic
Gynecology/Obstetrics
Urology
Otolaryngology
Plastic
Oral/Maxillofacial (OMFS)
Neurosurgery
• Head
• Spine
Thoracic
Vascular
• Aortic Aneurysm (AAA)
• Carotid endarderectomy (CEA)
• Infrainguinal reconstruction
• Other Aneurysm
• Veins
• Thoracic outlet syndrome (TOS)

Table 2 Algorithm for mapping the SASKCOR adjusted to target time frames

SASKCOR	TARGET TIME FRAME
1-29	80% within 12 months
30-49	80% within 6 months
50-64	80% within 3 months
65-79	90% within 6 weeks
80-94	95% within 3 weeks
95-100	95% within 24 hours

In 2004 the Research and Evaluation working group, a subcommittee of the SSCN co-chaired by representation from the WCWL and SSCN, was established. One of its aims was to oversee the evaluation of the validity of the priority scores.

Evaluation Plan

The evaluation plan for this validity analysis was prepared in collaboration with the Research and Evaluation working group. Validation is a process of evaluating the degree to which the available evidence supports the interpretability, appropriateness, and usefulness of the priority score as a measure of patient urgency and priority(10).

The overall evaluation goals were:

- To assess the validity of the priority scores in real world settings.
- To determine the acceptability, utility, and feasibility of the PCS when used in combination with procedure-specific urgency profiles.
- To recommend revisions to the tools where necessary, based on reliability and validity evidence.
- To produce guidelines for the interpretation of scores and make recommendations for appropriate use of the priority scores.

METHODS

All surgeons in Saskatchewan currently complete a priority form for each patient scheduled for surgery. However, the priority data are not currently used to prioritize patients for surgery. In addition to other relevant surgical data, priority form data are stored in the Surgical Patient Registry.

Because the set of priority items is specific to each priority score, data were provided in 18 separate data files. Data were cleaned and the data files with essential data elements and summary priority scores were merged.

Validation framework and validity questions

The appropriate validity tests relate to the underlying construct the tools were designed to measure and the intended use of the tools. The WCWL priority tools were designed to measure patient urgency based on clinical judgement. In an earlier WCWL paper, patient urgency was defined as a multidimensional construct that included both severity and the expected benefit of treatment (11). Severity was defined as the degree, extent or intensity of suffering, limits to activities, and risk of premature death. Expected benefit included both the extent or magnitude of benefit and likelihood of that benefit occurring. Relative priority may also include social factors, although its relevance to priority is controversial.

The framework for the validity analysis includes three components. Specific validity questions are included under each component.

Content of priority tools

An evaluation of the content of the priority tools is based on how relevant and representative the items are to the underlying construct the tool is designed to measure. The weighting of the items should be represented in proportion to their importance to the

construct. Weighting can be accomplished in two ways, by the number of items and by the weights given to each item. The items should be clear, non-ambiguous, and ideally, for interpretability of scores, items should measure one attribute (e.g., pain).

- Is the item content relevant and representative of the underlying construct?
- Are the items clear and unambiguous?

The scoring model

The scoring model describes the method of scaling by which item responses are combined to form scores. The scores should represent the underlying quantitative attribute of the construct being measured.

- Does the urgency profile in combination with the PCS improve the validity of the priority scoring system?

External validity

External validity assesses the degree to which the priority score's relationship with other measures is consistent with underlying theory. In this evaluation, two aspects of external validity were assessed: convergent and known group differences. **Convergent validity** is the ability of the priority scores to correlate with other measures that assess a similar construct. Based on validity results for the WCWL General Surgery(12), Hip and Knee Replacement (13;14), and Cataract PCS (15) , it was expected that correlations between the priority scores and the VAS urgency would be positive and 0.5 or stronger and that correlations between the priority scores and MAWT would be negative and 0.4 or stronger. A **known group differences** analysis examines the ability of the priority scores to discriminate between groups that are expected to differ on urgency.

- What is the correlation of the priority scores with other measures of urgency?

- Is there congruence between the target waiting times and surgeon-rated maximum acceptable waiting times (MAWT)?
- Do the priority scores differentiate between cancer and non-cancer patients?

Variables

The following variables were used in the validity analysis:

PCS

The weighted additive score for the PCS varies with the priority scores from 70 (Thoracic) to 194 (Vascular AAA). Therefore, for each score, a linear transformation was used to rescale the PCS to a 0-100 scale to facilitate the interpretation of scores across the measures.

SASKCOR

The SASKCOR consists of a PCS used in combination with a procedure-specific clinical urgency profile. Each surgical procedure is linked to a specialty grouping with an associated urgency profile. These profiles are based on a scale of clinical acuity from 1 (least urgent) to 100 (most urgent).

The calculation of the SASKCOR is as follows:

SASKCOR = (PCS/100)*(range of acuity band for procedure) + lower anchor of band.

Using an example, Case A had an abdominal perineal resection. The PCS was 50. The urgency profile for the procedure is 65 – 100. The SASKCOR is: ((50/100)*35) + 65 = 82.5.

SASKCOR adjusted

Although the urgency profile for all cancer cases (suspected and confirmed) is 80 – 100, the SASKCOR did not include an adjustment for this profile; SASKCORs for cancer cases ranged from 1 to 100. (However the urgency profile for cancer was accounted for in the target time frame). Therefore, a SASKCOR adjusted for cancer was calculated by recalculating the SASKCOR taking into account the urgency profile of 80 – 100 for cancer. The recalculated SASKCOR, adjusted for cancer, is referred to in this document as the 'SASKCOR adjusted'. Both the SASKCOR and the SASKCOR adjusted were used in the validity analysis.

Visual analogue scale (VAS Urgency)

Each surgeon was asked: 'All things considered, how would you rate the urgency or relative priority of this patient?' Patients were scored on a 0 'not urgent at all' to 10 'extremely urgent' (just short of an emergency) visual analogue scale (VAS Urgency) with numbers from 1 to 10 superimposed on the scale. VAS urgency scores were transformed to a 0 – 100 scale for comparison with priority scores.

Maximum Acceptable Waiting Time (MAWT)

Each surgeon was asked:
'In your clinical judgment, what should be the maximum acceptable waiting time for this patient?'

Responses were completed as the number of days, weeks, or months. All values were converted to weeks for the analysis.

Target Time Frames

Target time frames were coded as 6 ordinal (or ordered) levels (see Table 2).

Urgency Categories

Two urgency measures that were used prior to the current system of prioritization were available for Saskatoon and Regina. Urgency categories for Saskatoon were based on the target time frames showed in Table 3. They were recoded into 4 levels for the analysis: cancer, urgent (urgent and urgent1 combined), urgent2, and elective. Urgency categories for Regina were coded as either elective or urgent.

Table 3 Levels of Urgency and Associated Target Time Frames for Urgency Variables

CATEGORY	SUB CATEGORY	DESCRIPTION	TARGET TIME
Urgent	Cancer	Patients with cancer or suspected cancer	3 weeks
	Urgent[1] or Urgent 1	Patients with a non-malignant diagnosis whose conditions have become exacerbated or there is a likelihood of irreversible worsening	6 weeks
	Urgent 2	Not elective but not urgent	3 – 6 months
Elective		Surgical patients with conditions that can be accommodated with other similar patients	

[1]Urgent and urgent 1 are likely either the same or similar. They may have been coded differently for different hospitals.

Note: The information for this table was taken from a report by Patrick O'Byrne, presented at a Clinical Services Subcommittee Meeting

Cancer

A checkbox on each priority form differentiates non-cancer cases from those who had either proven or suspected cancer. It was coded yes or no.

Data Cleaning

Data cleaning is the process of checking the data for inconsistencies and inaccuracies before undertaking the analysis. Specific data cleaning procedures are outlined in Appendix A. In general, the majority of the data were suitable for analysis. Some of the data cleaning issues are due to the newness of the system and should be ironed out as the system matures. However, for future analysis, the identified problems should be rectified. Data inconsistencies can lead to attenuated correlations and inconsistent findings.

Following data cleaning, the following criteria were used to select the sample for the validity analysis:

- Cases booked from January 1, 2004 to October 12, 2004.
- Cases with a minimum of one priority criteria value.
- Cases who were either still waiting for surgery or those who had an actual waiting time of greater than 1 day to exclude emergency surgeries and/or cases with questionable booking dates.
- Cases with valid data values.

Data analysis

- Priority items for each measure were grouped into similar themes and the percentage of weighted content was compared across all of the priority scores.
- Items were examined for clarity.
- Graphs and descriptive statistics (mean, standard deviation, percentiles) were used to summarize the data and describe the relationship between the priority scores

and categorical (e.g., cancer variable) and ordinal data (e.g., Saskatoon urgency levels). **Percentiles** are points in a distribution below which a given percent of the cases lie. The median is the 50^{th} percentile: 50% of the scores are above the median and 50% are below. Percentile scores can be used to compare the relative performance on two different variables such as the PCS and SASKCOR adjusted. The **boxplot** is a summary plot based on the median, quartiles, and extreme values. The box, which contains 50% of the values, represents the interquartile range (25^{th} to 75^{th} percentile). The whiskers are lines that extend from the box to the highest and lowest values, excluding outliers. A line across the box indicates the median.

- The **Pearson correlation coefficient**, signified by *r*, was used to assess the convergent validity between the priority scores (PCS, SASKCOR, SASKCOR adjusted) and the other urgency variables (VAS urgency, MAWT, urgency categories). The correlation coefficient is a statistical summary of the strength and direction of a relationship between two variables and ranges from –1 to +1. A correlation of + or - 0.5 means that approximately 25% of the variance in one variable is explained by a second variable (r^2). As a guideline to assess the strength of a relationship, an *r* value greater than 0.3 was the minimal correlation considered clinically important (16). The value of a correlation coefficient is greatly influenced by the heterogeneity of the sample (the less variability, the lower the value of *r*). Skewed distributions and measurement error in the variables will also lower the *r* value.
- T-tests for independent means were used to test differences in priority scores for cancer vs. non-cancer patients. A t-test tests the hypothesis that the difference between two population means is zero.
- Target time frames were compared to MAWT.
- A significance level of <.05 was used for all statistical tests. However, it should be noted that when the sample size is very large, even a trivial difference may be large enough to be highly statistically significant. Therefore, a clinical or practical difference is more relevant for the interpretability of correlation coefficients or t-tests. For example, a mean difference in a PCS of 5 between

cancer vs. non-cancer cases might be statistically significant but clinically meaningless.

- To assess the scoring model, a further analysis was done for 6 tools: General Surgery, Orthopedics, Gynecology/Obstetrics, Urology, Otolaryngology, and Plastic surgery. The analyses included the frequency of surgical procedures, a correlation matrix of priority scores with the VAS urgency and MAWT, a correlation matrix of the VAS urgency and the priority items, a comparison of the distributions of the VAS urgency and the priority scores for the most common procedures, and an analysis of outliers. To assess the factor structure of the six tools, an exploratory factor analysis was performed using a) all of the items and b) the combined symptom items as they are used in practice (for example, in otolaryngology, Q3 usual intensity of other forms of suffering was treated as one item using the maximum value of suffering (none to severe) for any symptom). **Factor analysis** is a technique that attempts to explain the relationship among a set of observed variables in terms of relations among a smaller number of derived or latent variables, called factors. The method used was a principal components followed by a varimax rotation of the factors with roots greater than or equal to one. A factor loading is the correlation between the observed score and the factor. Factor loadings greater than .3 were considered important (16). The factor analysis is not central to the paper but adds to the understanding of the nature of the underlying latent constructs (or dimensions) of the priority tools. This information can be used for assisting in the conceptualization of the underlying constructs of priority scores and for priority tool refinement and development. These results are presented in the Appendices and major points are summarized in the results section under the scoring model.

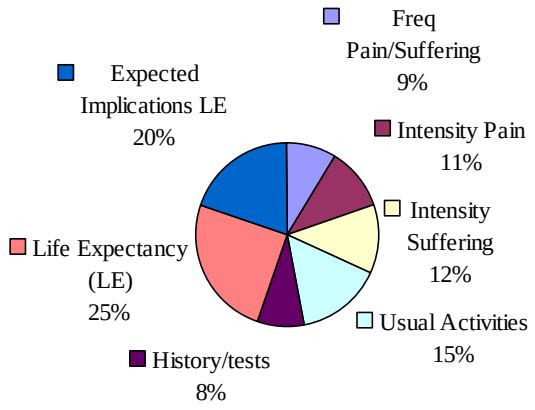
RESULTS

Content of the Priority Tools

The WCWL General Surgery Tool

The WCWL General Surgery tool consists of 7 priority criteria: usual frequency of painful episodes/suffering, intensity of pain, intensity of other symptoms, degree of impairment in usual activities, recent history of major complications or significant physical exam results or significant test results, life-expectancy implications of condition without procedure, and expected improvement in life expectancy with surgery. Six items are assessed on an ordinal scale with 4 to 5 levels (e.g., no pain to severe) and one item is dichotomous (yes, no). Weights for each priority criteria item were initially derived from regression analysis with a surgeon-rated VAS urgency as the dependent variable (17). The proportion of weighted content for the WCWL General Surgery tool is shown in Figure 1.

Figure 1 Proportion of Weighted Priority Criteria General Surgery



The Saskatchewan priority tools

The Saskatchewan General Surgery tool differs from the WCWL General Surgery tool in that it lists and scores each symptom. However, as only the highest symptom score is used, the scoring is essentially the same as the WCWL scoring. The other Saskatchewan tools were based on the WCWL General Surgery tool and include some of the same or similar items. Some of the tools include additional content, for example, patient role and independence, potential for progression, expected improvement in quality of life, and sociological urgency. In contrast to the other tools, the vascular tool includes condition-specific items pertaining to a diagnosis (e.g., progression of an aortic aneursym, TIA).

The percentage of item content in all of the priority scores is summarized in Table 4. Items on pain, suffering, or symptoms are included in all of the measures. Expected improvement with the procedure is included in all except hip and knee replacement and cataract surgery**.** Expected improvement in life expectancy with surgery is included in eleven of the measures [general surgery, neurosurgery head and spine, otolaryngology, urology, and vascular (all 6)] while expected improvement in quality of life (or condition) with the procedure is included in seven (OMFS, thoracic, neurosurgery head and spine, plastic, gynecology/obstetrics, and orthopedics). Social factors are included in the hip and knee replacement, cataract, orthopedic, gynecology/obstetrics, and OMFS measures.

Common items do not necessarily account for the same proportion of weight for the total score. For example, for the vascular priority scores, the proportion of the total PCS or SASKCOR accounted for by the five common items ranges from 38% (AAA) to 79% (veins). For the neurosurgery priority scores, it ranges from 72% (spine) to 82% (head).

Table 4 Percentage of Weight for Priority Criteria Items

	H&K	Cat	Surg	Ortho	Gyne	Urol	Oto	Plastic	OFMS	Neurosurgery		Thoracic	Vascular					
										Head	Spine		AAA	CEA	Inf	Other	Veins	TOS
Pain/suffering/symptoms	31	0	32	43	40	23	27	33	28	18	28	36	3	6	5	5	5	6
Impairment	19	23	15			14	16	15	15	14	12	14	8	14	13	12	13	16
Work/Role/dependents	20	19		20	10													
Stress													3	6	5	5	5	6
Exp/Imp Condition				7														
Disability		10																
QOL implication Rx					19			20	12	9	8	29						
Pot damage w/o Rx	20			20						18	16							
Sociological Urgency									9									
Timeliness									15									
TOTAL HRQL	**90**	**52**	**47**	**90**	**69**	**37**	**43**	**67**	**77**	**59**	**64**	**79**	**11**	**20**	**18**	**17**	**18**	**22**
Pot damage w/o Rx						15												
Life exp w/o Rx			25		24	23	27	25		23	20		13	24	22	20	22	27
Life exp with Rx			20			18	22			9	8		10	19	18	16	18	21
TOTAL Life Exp	**0**	**0**	**45**	**0**	**24**	**56**	**48**	**25**	**0**	**32**	**28**	**0**	**23**	**43**	**39**	**36**	**39**	**48**
History/Physical/Test	10		8	10	8	7	9	8	8	9	8	21	4	8	7	6	7	9
Visual Acuity		28																
Glare		18																
Ocular Morbidity		2																
Signs of infection									15									
Signs/diagnosis													62	29	35	40	35	21
TOTAL Other	**10**	**48**	**8**	**10**	**8**	**7**	**9**	**8**	**23**	**9**	**8**	**21**	**66**	**37**	**42**	**47**	**42**	**30**

Items related to HRQL and life expectancy may also be included under ‘other’, e.g., glare for cataract.

To compare item content across measures, priority criteria items were grouped into three broad content areas: health-related quality of life (HRQL), life expectancy, and other. Health-related quality of life is a multidimensional construct that assesses three broad areas of health: physical, psychological, and social(18). Priority criteria items included under each content area are as follows.

Health-Related Quality of Life

1. Pain/Suffering/Symptoms
    - Frequency of pain/suffering
    - Pain on motion
    - Pain at rest
    - Walk without pain
    - Intensity of pain
    - Intensity of pain/suffering
    - Intensity of suffering/symptoms
    - Intensity of symptoms
    - Frequency of suffering/symptoms
    - Frequency of acute episodes
    - Psychological stress
2. Impairment
    - Impairment of usual activities
    - Impairment of visual function
3. Role (work/dependents)
4. Potential for progression in QOL or condition without treatment
5. Other disability
6. Neurological deficit without treatment
7. Sociological urgency
8. Timeliness
9. Expected improvement QOL/condition with Treatment

Life Expectancy

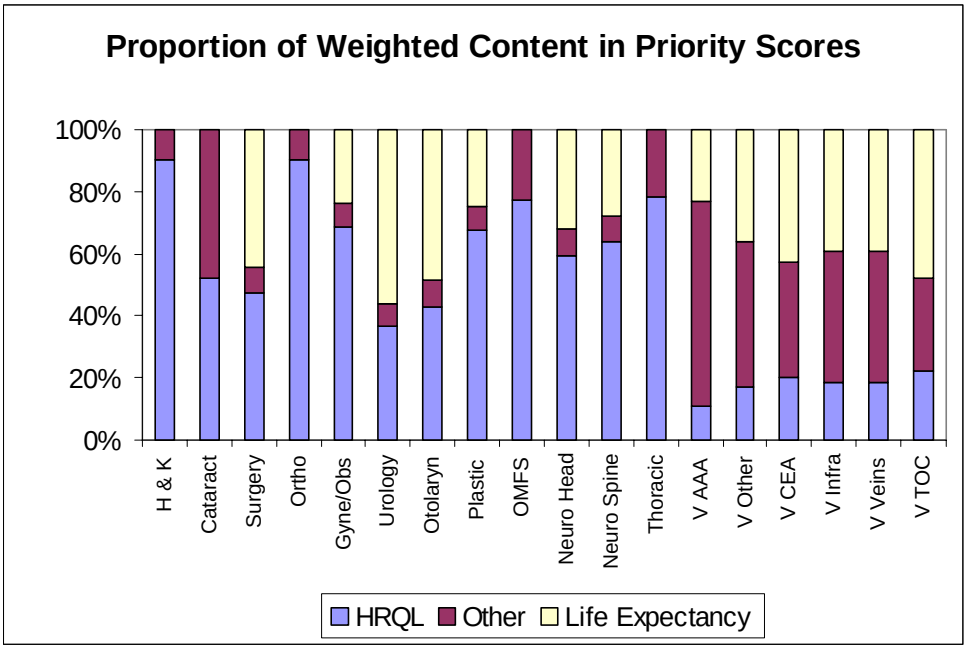
1. Life expectancy implications without surgery
    - Potential damage without treatment
2. Expected improvement in life expectancy with treatment

Other (history/physical/tests/signs)

1. History/physical/test
2. Condition specific signs/findings (e.g., claudication)
3. Visual acuity
4. Ocular co-morbidity
5. Glare
6. Signs of infection
7. Diagnosis

The proportion of weighted content in each priority score is shown in Figure 2. Aspects of HRQL are included in all of the measures with the proportion of the total weight ranging from 11% (Vascular AAA) to 90% (orthopedics and hip and knee replacement). The weight for aspects of life expectancy ranges from 0% (hip and knee replacement, cataract, orthopedic, OMFS, and thoracic surgery) to 56% (urology). The 'other' category includes some priority criteria items that relate directly to either HRQL (e.g., visual acuity) or life expectancy (e.g., aortic aneurysm).

Figure 2 The Percentage of Weighted Content for Each Priority Tool



Clarity and interpretability of the items

General Observations

Although the tools measure many of the same attributes, there are slight variations in item wording across many of the tools, e.g., expected improvement in quality of life with surgery (plastic) and expected improvement in life quality with surgery (thoracic).

The items assessing the frequency and intensity of other suffering and symptoms cover an array of different types of attributes. For example, in the thoracic tool, it includes physical symptoms, psychological stress, signs, CT/MRI results, economic factors, and sepsis. Because only the highest score for any one attribute in the item is used in the calculation of the priority score, a patient with a severe level on one attribute will score higher than a person with a moderate intensity on one or more attributes. For example, a person that scores a 'severe' on economic factors and 'none' on other forms of suffering will have a higher score than a person with moderate scores on any number of symptoms including nausea, fatigue, weight loss, dyspnea, psychological stress, and sepsis.

Some items are multidimensional (i.e., assess more than one attribute or dimension). An example is 'Expected improvement in life expectancy/quality of life with surgery' (neurosurgery).

Specific Observations

Gynecology/Obstetrics

Q1 Usual frequency of painful episodes/suffering
Q2 How intense is the pain at its worst?
Q3a Usual intensity of symptoms (lists 7 symptoms)
Q3b Usual frequency of symptoms (lists 7 symptoms)

There is a potential overlap in Q1 and Q3b. It is not clear whether Q1 is intended to assess pain only. An analysis of responses to these items showed that in 152 cases, frequency of symptoms other than pain, may be scored two times (i.e., Q1 and Q3b).

Orthopedic Surgery

Q1 Usual intensity of pain. *Take into account usual duration, intensity, and frequency of pain, including need for narcotic vs. non-narcotic medication.*
Q2 Usual frequency of pain

Frequency of pain is considered in Q1 and is also assessed in Q2.

Otolaryngology

Q1 Usual frequency of significant suffering
Q2 How intense is the suffering at its worst?
Q3 Usual intensity of other forms of suffering (lists 4 forms of suffering including hearing loss, speech delay, impending airway obstruction, and psychological stress)

There is a potential overlap of content in Q2 and Q3. For example, if hearing loss is the most significant form of suffering, should its intensity be scored in Q2, Q3, or both?

Vascular – AAA, CEA, TOS

The condition-specific items include life-threatening emergency conditions (e.g., aortic aneurysm) that can account for a large proportion of the weight of the PCS. For example, in the AAA priority score, the progression of an aortic aneurysm (inflammatory to ruptured) accounts for 52% of the total score (100 of 194 points).

Summary of Findings

- The tool content includes three broad categories: HRQL, life expectancy, and other (history, results of physical examinations and tests, and diagnosis).
- All of the tools assess HRQL with proportions of the total weighted priority score ranging from 11% to 90%.
- Aspects of life expectancy are included in most but not all of the tools; the proportion of the total weighted priority score ranges from 0% to 56%.
- Expected improvement in quality of life or life expectancy with the procedure is included in most but not all of the tools.
- Social factors are included in five priority tools.
- Although the priority tools measure many of the same attributes, there are slight variations in item wording across many of the tools.
- The questions assessing symptoms or suffering include an array of attributes across the tools – physical and psychological symptoms, signs, test results, and economic factors.
- Some of the items overlap in content and therefore, may be open to interpretation.
- Some of the vascular priority scores include emergency conditions.

Description of the Sample

The sample consisted of 32,527 cases who were either waiting (45%) for or who were post- surgery (55%). VAS Urgency data were available for 31,678 cases, and MAWT data were available for 27,447 cases. Cancer data were available for 87% of the cases.

For cases post-surgery, the average actual waiting time was 7 weeks (SD 7 weeks). Data for the Vascular – TOS were excluded from the quantitative analysis because of a small number of cases. Table 5 shows the frequency of cases for each priority tool and includes the percentage of females and males, age groups, and suspected or confirmed cancer cases. The highest percentages of children and adolescents were seen in otolaryngology (53%) and OMFS (76%). The percentage of cases with proven or suspected cancer assessed with each tool ranged from 0% (hip and knee replacement, cataract, orthopedic, OMFS, Neurology – spine, and Vascular – AAA, CEA, infrainguinal, and other aneurysm) to 90% (thoracic).

Table 5 Characteristics of Cases

Priority Tool	Frequency		Sex		Age			Cancer
	N	%	Male (%)	Female (%)	<12 (%)	12 - 17 (%)	18+ (%)	Yes (%)
Hip and Knee	2076	6	42	58	0	0	100	0
Cataract	4441	14	41	59	0	0	100	0
General Surgery	6055	19	43	57	2	1	96	29
Orthopedic	4131	13	55	45	2	5	93	0
Gynecology/Obstetrics	6091	19	0	100	0	1	99	10
Urology	2470	8	77	23	11	2	88	37
Otolaryngology	3356	10	56	44	43	10	47	5
Plastic	1867	6	32	68	8	4	88	9
OMFS	701	2	49	51	62	14	24	0
Neurosurgery Head	86	0	50	50	9	2	88	25
Neurosurgery Spine	574	2	55	45	0	0	99	0
Thoracic	277	1	50	50	0	1	99	90
Vascular AAA	47	0	79	21	0	0	100	0
Vascular CEA	62	0	61	39	0	0	100	0
Vascular Infrainguinal	87	0	61	39	0	0	100	0
Vascular Other aneurysm	25	0	60	40	0	4	96	0
Vascular Veins	181	1	23	77	0	1	99	1
Total	32527							

Because of rounding, percentages do not necessarily add to 100.

Table 6 shows the frequency of cases in each regional health authority. Saskatoon (54%) and Regina-Qu' Appelle (21%) had the highest percentage of cases.

Table 6 Frequency of Cases by Regional Health Authority

Regional Health Authority	*Frequency*	*Percent*
Five Hills Regional Health Authority	2207	7
Cypress Regional Health Authority	750	2
Regina-Qu' Appelle Regional Health Authority	6684	21
Sunrise Regional Health Authority	1375	4
Saskatoon Regional Health Authority	17559	54
Prince Albert-Parkland Regional Health Authority	2465	8
Prairie North Regional Health Authority	1487	5
Total	32527	100

Descriptive statistics including the mean, standard deviation (SD), and 25th, 50th (median), and 75th percentiles for the priority scores and urgency measures are shown in Tables 7 (total sample) and 8 (each score). The overall median VAS urgency was 60.0 and the median MAWT was 12.9 weeks. The overall median PCS was 35.5 compared to 49.0 for the SASKCOR adjusted. Individual priority scores are difficult to interpret unless they are accompanied by relevant data that will place the scores in an interpretive context. One way of understanding a priority score is to see where the score stands in relation to the scores of other individuals. Table 7 can be used to make a rough judgment about the relative priority of an individual. For example, suppose that an individual's VAS falls between 0 and 40. We would know that he or she is amongst the 25% least urgency cases. If an individual's VAS falls above 80, he or she would be amongst the 25% most urgent cases. Similarly if an individual's PCS falls between 0 and 19 or the SASKCOR adjusted falls between 0 and 30, he or she would be amongst the 25% least urgent cases. When percentiles are based on a representative sample of the population, they are useful as norms to aid in the interpretation of priority scores. However, because the PCS and SASKCOR adjusted are based on different tools, it is more appropriate to interpret the priority scores within rather than across the priority tools. For example, an individual with a SASKCOR adjusted of 55 would be in the 25% most urgent group for Plastic Surgery and in the 25% least urgent group for Neurosurgery – spine (Table 8).

Table 7 Descriptive statistics for the Priority Scores and Urgency Measures

		VAS	*PCS*	*SASKCOR*	*SASKCOR adjusted*	*MAWT (weeks)*
Mean		55.7	37.3	48.1	50.1	16.9
Median		60.0	35.5	48.0	49.0	12.9
SD		25.3	22.5	25.2	26.8	14.0
Percentiles	25	40.0	19.0	30.0	30.0	6.0
	50	60.0	35.5	48.0	49.0	12.9
	75	80.0	51.6	69.0	73.0	25.8

Note: the 50th percentile is the median.

Table 8 shows that the distributions of priority scores and MAWT varies across the tools. Neurosurgery (head) had the highest median priority score while otolaryngology and vascular – veins had the lowest. The median VAS Urgency ranged from 30 (Vascular – veins) to 80 (neurosurgery – head and spine, thoracic, and vascular – all except veins). The median MAWT ranged from 3 weeks (thoracic) to 26 weeks (cataract, otolaryngology, OMFS, and vascular – veins).

Figures 3 shows the boxplots of the distribution of priority scores for each tool. For most of the tools, the addition of the urgency profile to the PCS (i.e., SASKCOR and SASKCOR adjusted) shifts the distribution upwards. This is due mainly to the lower value for the urgency profile. For example, for general surgery, the median values for the PCS, SASKCOR, and SASKCOR adjusted were 30, 51, and 53 respectively; 92% of the cases had a lower urgency profile value of 25 or greater.

The largest median difference between the PCS and SASKCOR (approximately 50 points) was in the vascular – AAA and vascular – other priority scores. This is due to 2 factors: the large proportion of weight of the PCS pertaining to emergency conditions and the procedure – specific urgency profile. For example, in the vascular AAA tool, the maximum weight for the diagnostic item accounts for 52% of the weight of the PCS. None of the cases had a ruptured aneurysm and therefore the highest possible value for

the PCS (on a 0 – 100 scale) for the next most urgent condition (i.e., symptomatic aortic aneurysm) is 64 (the maximum PCS for vascular AAA was 61). However, all AAA cases have an urgency profile of 70 – 100, thus resulting in an upward shift of priority scores.

In contrast, for the plastics tool, the distribution shifted downwards and the median values for the PCS, SASKCOR, and SASKCOR adjusted were 36, 25, and 26, respectively. For hip and knee replacement and cataract, the urgency profiles are constant (1 – 80 and 1 – 95, respectively) and cover a large range. Therefore, the distributions for the PCS and SASKCOR are similar.

Figure 4 shows the distribution of the PCS and SASKCOR adjusted for each tool. The Y axis is the number of cases (note that the scale of the Y axis differs across the tools). The shape of the distribution and the range of priority scores varies with the type of priority score and the tool. For the general surgery, otolaryngology, and urology scores, the addition of the urgency profiles created a bimodal distribution (i.e., two distinctly different points around which the scores cluster). For the general surgery tool and urology scores, the majority of cases that clustered around the higher mode were cancer cases. For the otolaryngology score, the main procedure in the higher mode was myringotomy with tubes. Although the distribution of the otolaryngology SASKCOR adjusted appeared to shift upwards and the higher mode became more pronounced, the median SASKCOR adjusted (13) was lower than the median PCS (15).

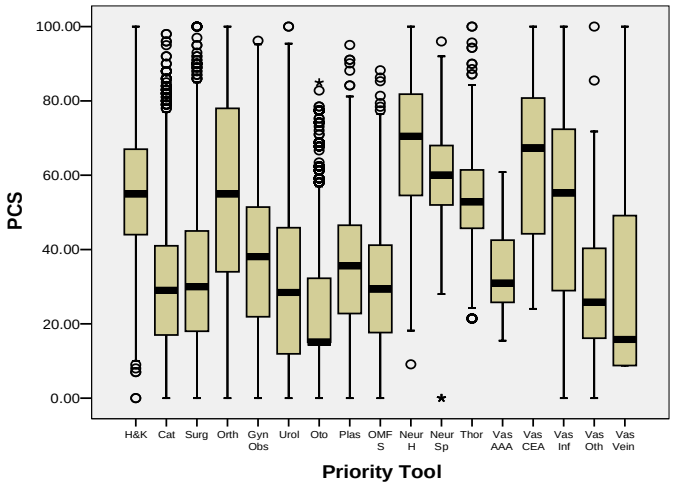
Summary of Findings

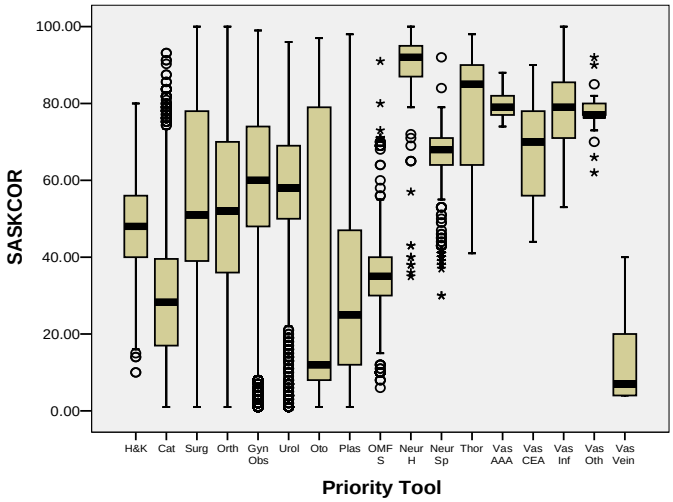
- The analysis consisted of 32,527 cases who were either waiting (45%) or post surgery (55%).
- The distribution of priority scores and MAWT varied across the measures.
- Percentiles show that an individual priority score is interpretable in the context of the distribution of priority scores for that measure. However, an interpretation across all priority scores (for all tools) should be made with caution.

Table 8 Descriptive Statistics for the Priority Scores and Urgency Measures

		Hip & Knee	Cataract	Gen Surg	Ortho	Gyne /Obs	Urology	Oto	Plastic	OMFS	Neuro Head	Neuro Spine	Thoracic	Vas AAA	Vas CEA	Vas Infra	Vas Other	Vas Veins
PCS	Mean	55.9	30.5	32.3	55.5	36.5	30.7	23.4	35.5	29.5	66.9	60.4	54.5	33.6	64.2	53.8	32.5	30.6
	SD	19.7	17.4	18.6	25.7	20.6	22.1	14.7	16.1	17.5	19.6	11.7	16.6	12.4	24.5	29.7	23.8	26.7
Percentiles	25th	44.0	17.0	18.0	34.0	21.9	11.5	15.1	22.8	17.6	54.5	52.0	45.7	25.3	44.0	28.1	16.1	8.8
	50th	55.0	29.0	30.0	55.0	38.1	28.4	15.1	35.6	29.4	70.5	60.0	52.9	30.9	67.3	55.3	25.8	15.8
	75th	67.0	41.0	45.0	78.0	51.4	45.9	32.3	46.5	41.2	81.8	68.0	62.9	43.3	82.0	72.8	40.3	49.1
SASKCOR	Mean	48.6	29.7	54.8	52.4	58.1	56.7	35.2	32.4	35.1	85.7	65.7	78.1	79.6	68.1	79.4	77.6	12.5
	SD	13.9	16.4	23.2	23.5	22.2	19.7	32.1	24.9	11.2	17.2	9.6	14.7	3.7	14.8	12.7	6.2	10.4
Percentiles	25th	40.0	17.0	39.0	36.0	48.0	50.0	8.0	12.0	30.0	87.0	64.0	64.0	77.0	55.8	71.0	77.0	4.0
	50th	48.0	28.3	51.0	52.0	60.0	58.0	12.0	25.0	35.0	92.0	68.0	85.0	79.0	70.0	79.0	77.0	7.0
	75th	56.0	39.5	78.0	70.0	74.0	69.0	79.0	47.0	40.0	95.0	71.0	90.0	82.0	78.8	86.0	80.5	20.0
SASKCOR adj	Mean	48.7	29.8	57.9	52.5	60.2	64.0	36.9	35.4	35.1	85.7	65.9	89.8	79.6	68.1	79.4	77.6	12.8
	SD	14.0	16.5	24.6	23.5	23.5	24.0	33.5	27.8	11.3	17.2	9.8	5.8	3.7	14.8	12.7	6.2	11.9
Percentiles	25th	40.0	17.0	39.0	36.0	49.0	50.0	8.0	13.0	30.0	87.0	64.0	89.1	77.0	55.8	71.0	77.0	4.0
	50th	48.0	28.3	53.0	52.0	62.0	65.0	13.0	26.0	35.0	92.0	68.0	90.0	79.0	70.0	79.0	77.0	7.0
	75th	56.0	39.5	84.0	70.0	80.0	85.5	81.0	52.0	40.0	95.0	71.0	92.3	82.0	78.8	86.0	80.5	20.0
VAS	Mean	57.8	50.5	52.7	58.4	55.5	59.7	59.4	48.2	49.9	77.2	72.8	82.1	79.6	74.9	71.3	63.6	36.9
	SD	21.5	19.0	26.2	25.6	29.7	23.4	21.8	26.3	22.9	15.4	14.1	13.5	17.4	19.3	25.4	38.2	30.7
Percentiles	25th	50.0	40.0	30.0	50.0	40.0	40.0	50.0	30.0	30.0	70.0	60.0	80.0	70.0	70.0	60.0	30.0	0.0
	50th	60.0	50.0	60.0	60.0	60.0	70.0	50.0	50.0	50.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	30.0
	75th	70.0	60.0	70.0	80.0	80.0	80.0	80.0	70.0	70.0	90.0	80.0	90.0	90.0	90.0	90.0	90.0	70.0
MAWT	Mean	22.4	21.5	11.7	17.4	15.1	12.5	18.5	23.9	31.6	6.4	10.8	4.2	6.5	5.3	7.5	5.7	27.5
	SD	17.0	7.5	11.8	13.3	12.4	14.1	12.7	17.4	29.1	5.6	8.5	5.9	5.4	5.8	8.8	6.5	19.1
Percentiles	25th	12.9	17.2	3.0	6.0	4.3	4.0	6.0	12.9	12.9	3.0	4.3	3.0	3.0	3.0	3.0	2.0	12.9
	50th	12.9	25.8	8.0	12.9	12.9	8.0	25.8	17.2	25.8	4.3	8.6	3.0	6.0	3.0	4.0	4.0	25.8
	75th	25.8	25.8	12.9	25.8	25.8	12.9	25.8	34.4	51.6	8.6	12.9	3.0	6.0	6.0	8.0	6.0	25.8

Figure 3 Distribution of the Priority Scores





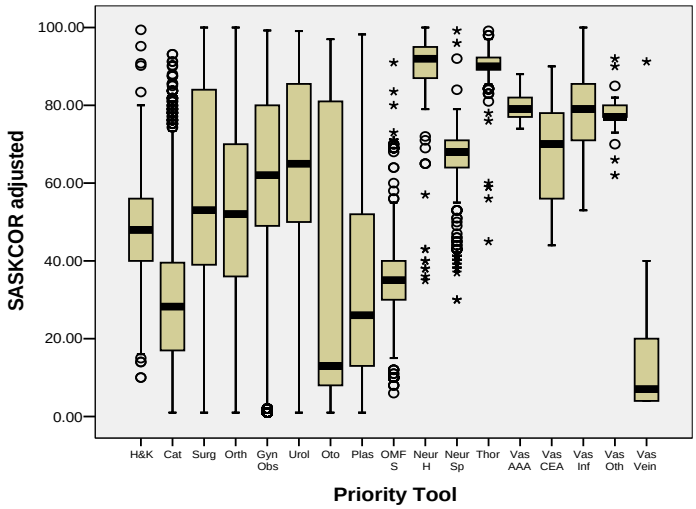
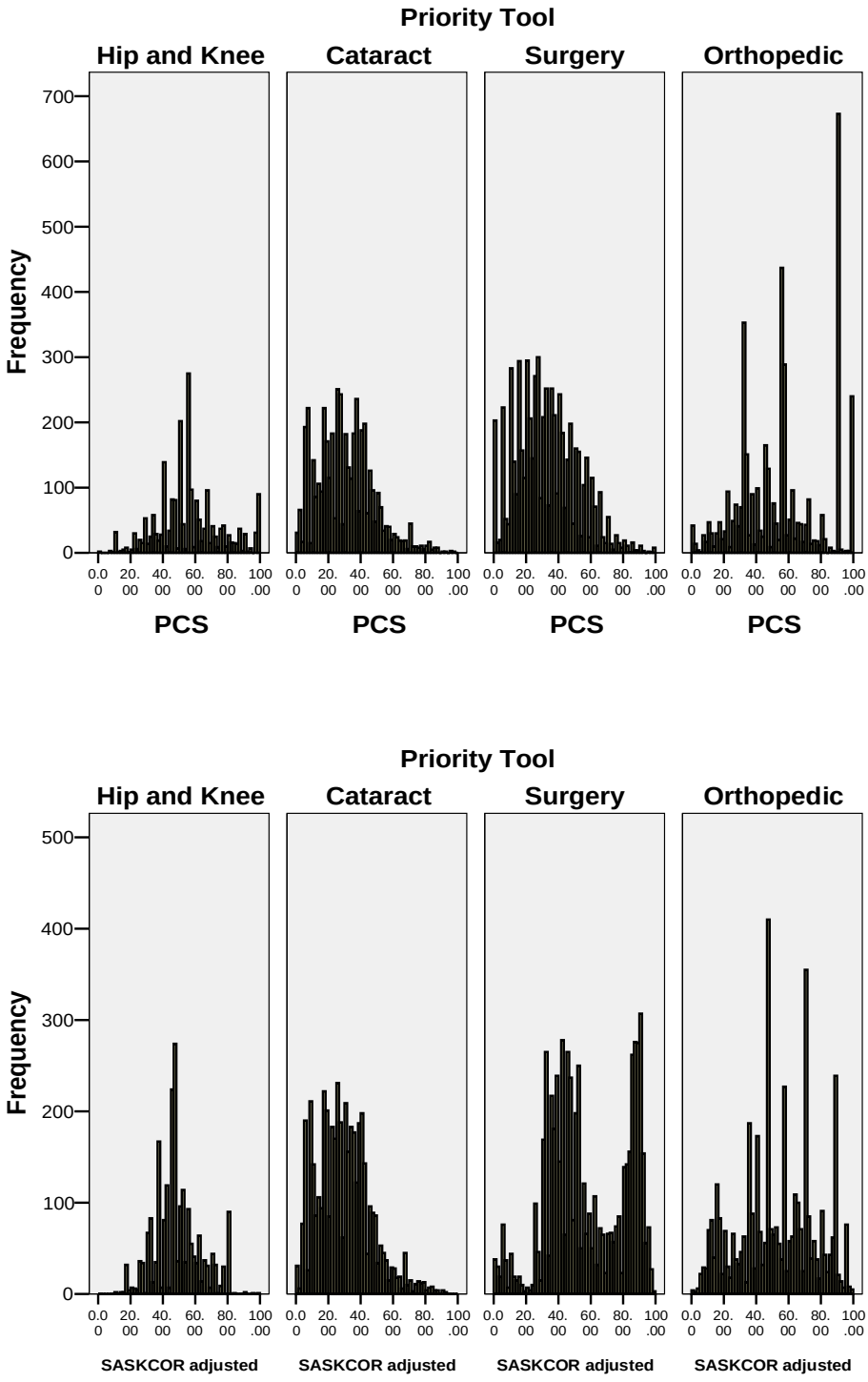


Figure 4 Histograms of PCS and SASKCOR Adjusted



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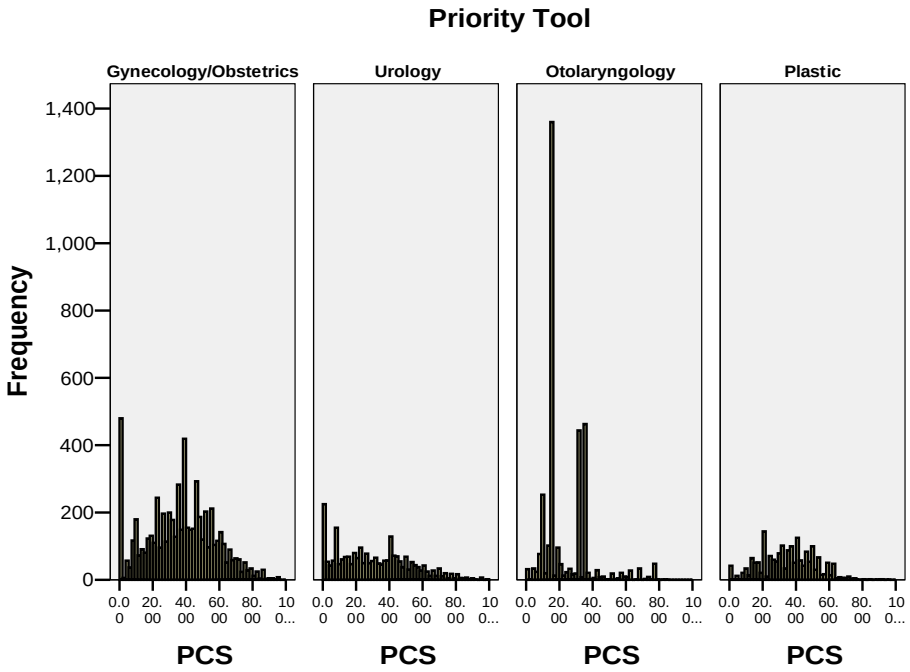

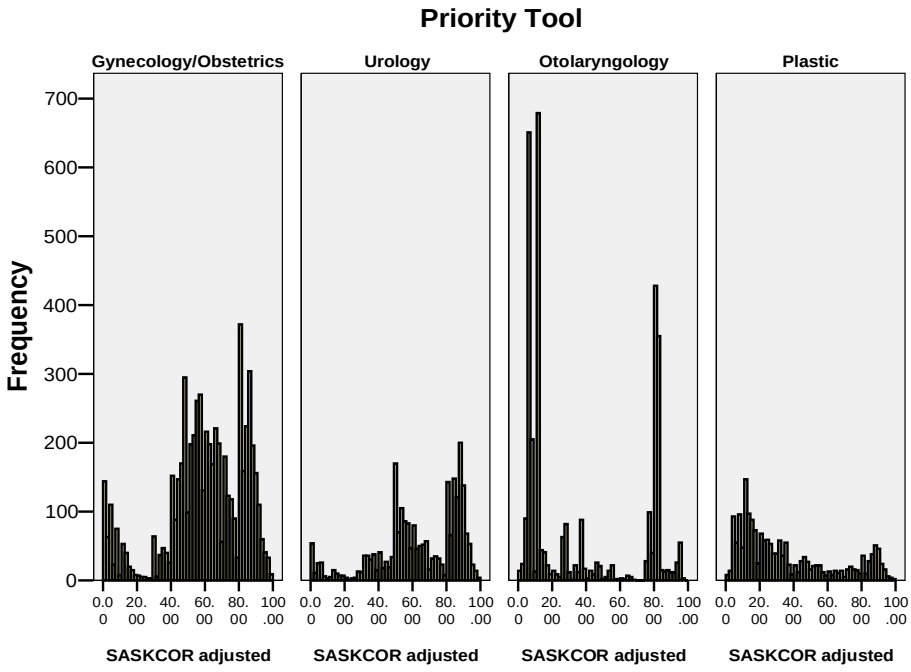

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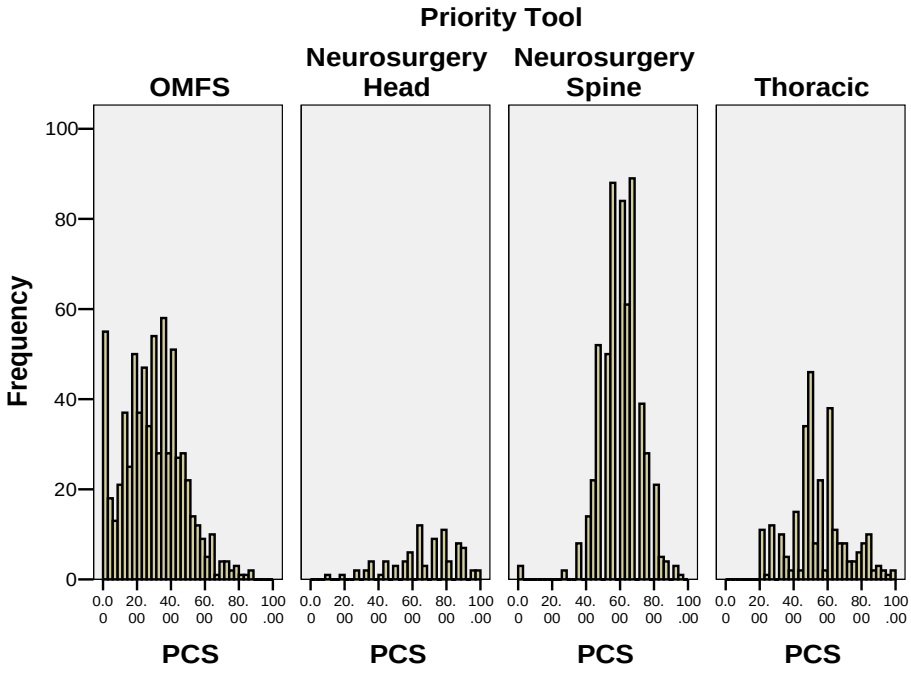

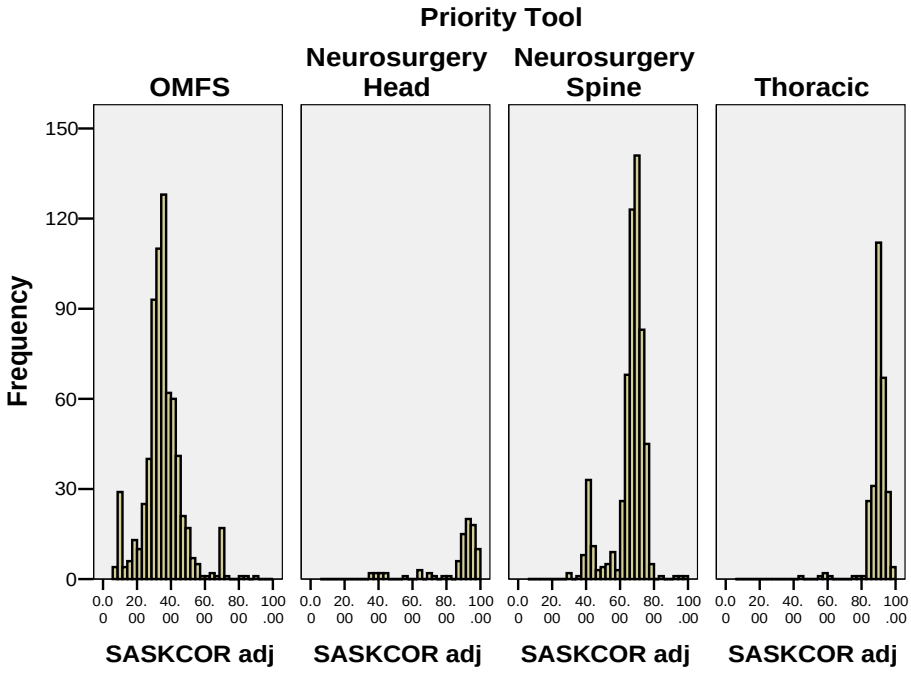

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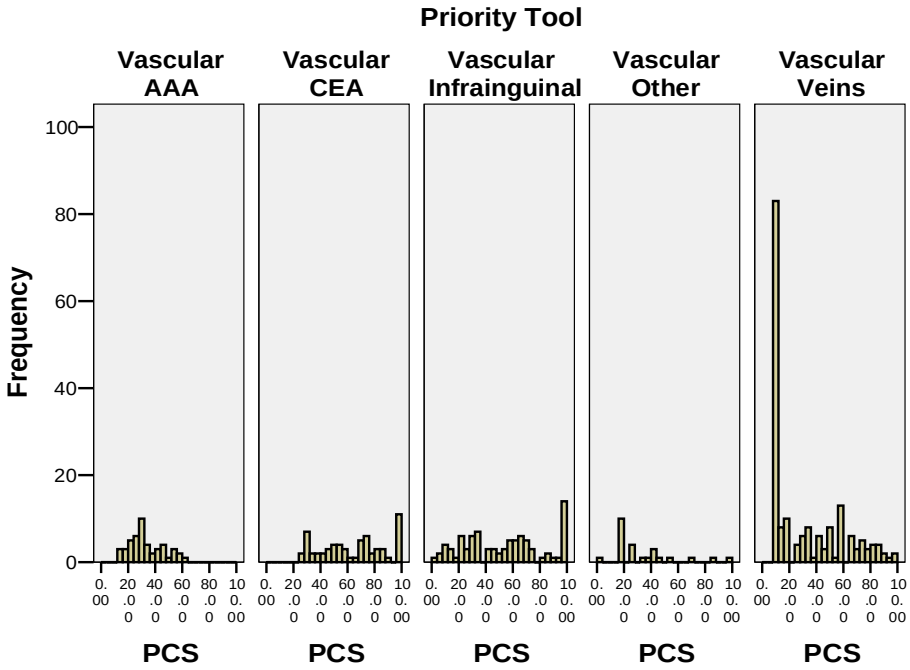
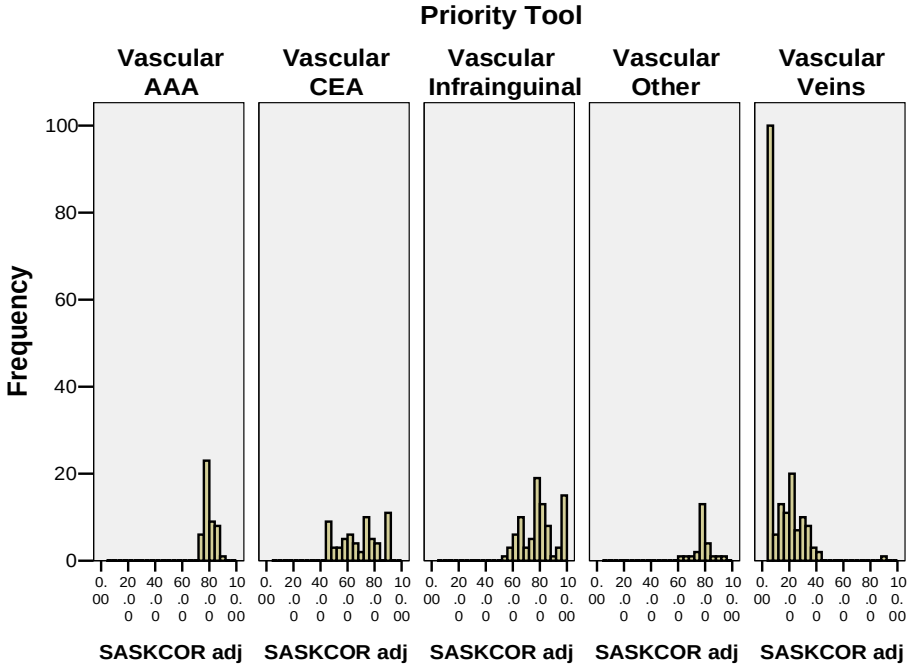




Scoring model

The analysis included a comparison of the two scoring models, the PCS with and without the condition-specific urgency profiles. Overall, there were 83 urgency profiles (Appendix B). The low and high values determine the range of possible target waiting times for surgery. For example, 69% of orthopedic cases and 31% of plastic surgery cases had a lower boundary value of 30 or greater and therefore, will have a target waiting time within 6 months or less (Table 9). One hundred percent of Vascular – AAA, infrainguinal, and other aneurysm cases had a lower boundary of 50 or greater and therefore, would have a target waiting time within 3 months or less. Thirty three percent of orthopedic and 100% of vascular veins had a higher boundary <50 (target waiting time within 6 or 12 months).

Table 9 Percentage of cases within low and high boundaries of urgency profiles

Priority Tool	*Urgency Profiles*		
	Lower bound 30+	Lower bound 50+	Higher bound <50
Hip and Knee	0	0	0
Cataract	0	0	0
Surgery	33	33	5
Orthopedic	69	6	33
Gynecology/Obstetrics	89	45	10
Urology	90	67	5
Otolaryngology	39	32	21
Plastic	31	15	27
OMFS	63	5	2
Neurosurgery Head	98	83	0
Neurosurgery Spine	100	78	0
Thoracic	56	55	0
Vascular AAA	100	100	0
Vascular CEA	100	0	0
Vascular Infrainguinal	100	100	0
Vascular Other	100	100	0
Vascular Veins	0	0	100

Note: values do not include the urgency profiles for cancer. However, many procedures that are more likely to have a potential cancer diagnosis have higher urgency profiles (e.g., breast biopsy 75 – 94).
Low 30+ urgency profile: target waiting time within 6 months or less
Low 50+ urgency profile: target waiting time within 3 months or less
High <50 urgency profile: target waiting time within 6 or 12 months

To assess the effect of the urgency profile on the validity of priority scores, six priority tools were selected for a more in-depth comparative analysis. These included general surgery, orthopedic surgery, gynecology/obstetrics, urology, otolaryngology, and plastic surgery. The results are shown in Appendices C to H and a summary of the findings is presented below. For each of the tools, the results include:

- Table A1 List of procedures
- Table A2 Descriptive statistics
- Table A3 Correlation Matrix of Priority Scores with VAS urgency and MAWT
- Table A4 Correlation Matrix of the priority criteria items
- Table A5 Factor Structure using all of the priority criteria items
- Table A6 Factor structure using the combined symptom scores (if applicable)
- Table A7 A list of the procedures for cases that were identified as outliers (defined as cases that had a VAS >75th percentile and a SASKCOR adjusted < 25th percentile).
- Figure A1 Distribution of the VAS and Priority Scores for all cases
- Figure A2 Distribution of the VAS and Priority Scores for the most common procedures
- Figure A3 The Distribution of Maximum Acceptable Waiting Times (MAWT) for levels of Target Waiting Time

Comparative analysis of Six Selected tools (General surgery, Orthopedic, Gynecology/Obstetrics, Urology, Otolaryngology, and Plastic Surgery)

Distributions of the VAS and priority scores

Correlations between the PCS and SASKCOR adjusted ranged from 0.43 (orthopedics) to 0.65 (otolaryngology). Thus, approximately 18% to 42% of the variance in the SASKCOR adjusted can be explained by the PCS. Correlations between the VAS urgency and the PCS (range 0.45 to 0.72) were higher than correlations between the VAS urgency SASKCOR adjusted (range 0.31 to 0.58) for four of the tools. Correlations

between the MAWT and SASKCOR adjusted (range –0.35 to -0.72) were higher than correlations between the MAWT and PCS (range -.02 to –0.63) for 5 of the tools.

Inter-item correlations

Examining the inter-item correlations provides an initial assessment of the pattern of interrelationships between items. It also serves as an input to the factor analysis. Generally, the items that most strongly correlated with the VAS urgency were life expectancy items. An exception was otolaryngology, where hearing and speech were more strongly correlated with the VAS urgency (0.61, and 0.54, respectively).

To examine the effect of altering the otolaryngology weights, the relative weight for hearing was increased to reflect the stronger correlation of hearing with the VAS (0.61) compared with the other symptoms. The re-weighted PCS increased the correlation of the PCS with the VAS urgency from 0.47 to 0.57.

In the five tools with life expectancy criteria (general surgery, gynecology/obstetrics, urology, otolaryngology, and plastic surgery), 98% of the correlations between the life expectancy items and physical symptoms (e.g., pain, nausea, fatigue) were <0.30 (range –0.23 to 0.31). Correlations of life expectancy items with psychological stress tended to be higher (range 0.07 – 0.88). The orthopedic tool was unique in that all of the correlations between the priority criteria and the VAS urgency were >0.30 (range 0.33 – 0.71) and inter-item correlations were higher than those of the other five tools (range 0.26 – 0.75).

Factor Structure

A principal components factor analysis was used with a) all of the priority criteria items and b) all items with the combined symptom sub-items as one item. The factor analysis showed that the orthopedic surgery tool yielded one factor, and the other five tools yielded two or more factors. A common characteristic of these five tools was the

inclusion of life expectancy criteria. Psychological stress and history/tests/results tended to load with the life expectancy items. Pain and impairment of usual activities tended to load on the same factor.

Procedure-specific priority score comparisons

Generally, the urgency profiles reduced the range of priority scores for specific procedures. For the procedures that were considered high urgency (e.g., breast biopsy and myringotomy with tubes, with urgency profiles of 75 – 94, and 75 – 97, respectively), the range of the urgency profile was generally congruent with a higher median VAS urgency for that procedure. For example, a myringotomy with tubes had a median VAS urgency of 80 compared with an overall median otolaryngology VAS urgency of 50. Some exceptions were noted. For example, a D & C (urgency profile 80 – 100) had a median VAS urgency of 40 (range 0 – 100). Procedures with low urgency profiles (e.g., vein/stripping 1 – 40) were generally consistent with lower median VAS values (median 30) but there were some exceptions. For example, the procedure 'arthroscopic shoulder repair bankhart putti plat' (urgency profile 30 – 49) had a median VAS urgency of 80 compared to an overall median orthopedic VAS urgency of 60.

Outliers

For each tool, cases were identified whose SASKCOR adjusted was below the 25th percentile (i.e., ranked in the lowest 25% of cases) and whose VAS Urgency was above the 75th percentile (i.e., ranked in the highest 75% of cases). These are cases that potentially could have a lower target time than their degree of urgency warrants. Inaccurate coding of procedures, mistakes in scoring, and data entry errors could explain the scoring of some of these cases.

Summary of findings for six priority tools

Correlations of the Priority Scores with VAS and MAWT

- For 4 of 6 of the tools, correlations between the VAS urgency and PCS were higher than correlations between the VAS urgency and SASKCOR adjusted.
- For 5 of 6 of the tools, correlations between the MAWT and SASKCOR adjusted were higher than correlations between the MAWT and PCS.

Inter-item Correlations and Factor analysis

- In the five tools with life expectancy criteria (general surgery, gynecology/obstetrics, urology, otolaryngology, and plastic surgery), 98% of the correlations between life expectancy items and physical symptoms (e.g., pain, nausea, fatigue) were less than 0.30 (range –0.23 to 0.31).
- The factor analyses showed that the orthopedic surgery tool yielded one factor, and the other five tools (all with life expectancy criteria) yielded two or more factors.
- Psychological stress and history/tests/results tended to load with the life expectancy items.
- Pain and impairment of usual activities loaded on the same factor.

Procedure-specific urgency profiles

- Generally, the urgency profiles reduced the range of priority scores for specific procedures.
- For the high and low urgency procedures (reflected by a small range of urgency scores), generally the distributions of the SASKCOR adjusted and VAS urgency were congruent (i.e., a higher urgency procedure had a higher median VAS urgency). However, there were some exceptions.

Outliers

- Cases were identified whose SASKCOR adjusted was below the 25th percentile (i.e., ranked in the lowest 25% of cases) and whose VAS Urgency was above the 75th percentile (i.e., ranked in the highest 75% of cases). These are cases that potentially could have a lower target time than their urgency warrants. It is important to identify these cases and explore the reason for the scoring discrepancy.

Convergent validity

Table 10 is a correlation matrix of the three priority scores, VAS Urgency, and MAWT across all cases. As expected, correlations between the priority scores and VAS Urgency were positive and ranged from 0.41 (SASKCOR) to 0.48 (PCS) and correlations between the priority scores and MAWT were negative, ranging from –0.28 (PCS) to –0.49 (SASKCOR adjusted). Correlations between the PCS and SASKCOR adjusted were 0.52. The correlation between actual waiting time and the SASKCOR adjusted was -0.33 (results not shown).

Table 10 Pearson correlation coefficients for priority scores, VAS Urgency, and MAWT.

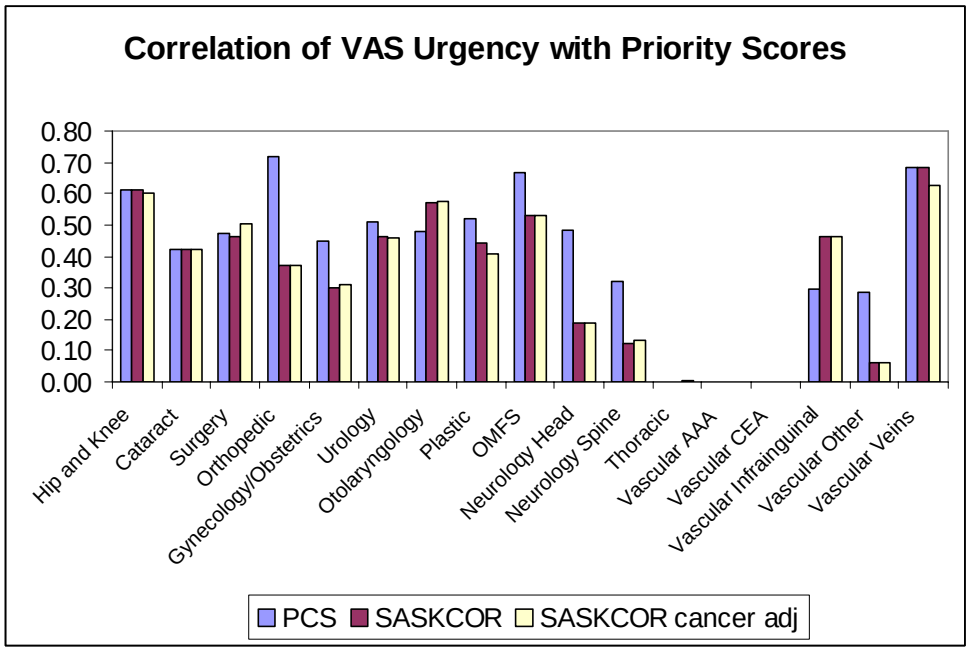
	PCS	*SASKCOR*	*SASKCOR adjusted*	*MAWT (weeks)*
SASKCOR	0.55			
SASKCOR adjusted	0.52	0.95		
MAWT (weeks)	-0.28	-0.46	-0.49	
VAS Urgency	0.48	0.41	0.42	-0.46

Figure 5 shows the correlations between the VAS urgency and the three priority scores (PCS, SASKCOR, and SASKCOR adjusted) for each measure. Correlations between the PCS and VAS Urgency were positive and 0.5 or stronger (rounded to one decimal point) for 10 of the scoress: hip and knee surgery, general surgery, orthopedics,

gynecology/obstetrics, urology, otolaryngology, plastic, OMFS, neurosurgery – head, and vascular – veins. Correlations between the SASKCOR adjusted and VAS Urgency were positive and 0.5 or stronger for 7 of the scores: hip and knee replacement, general surgery, urology, otolaryngology, OMFS, vascular – infrainguinal and vascular – veins. Results were similar with the SASKCOR and the SASKCOR adjusted.

A comparison of the correlations of the VAS Urgency with the PCS vs. the SASKCOR adjusted showed that there was 0.3 or less of a difference across all of the measures.

Figure 5 The Correlation of VAS Urgency with Three Priority Scores

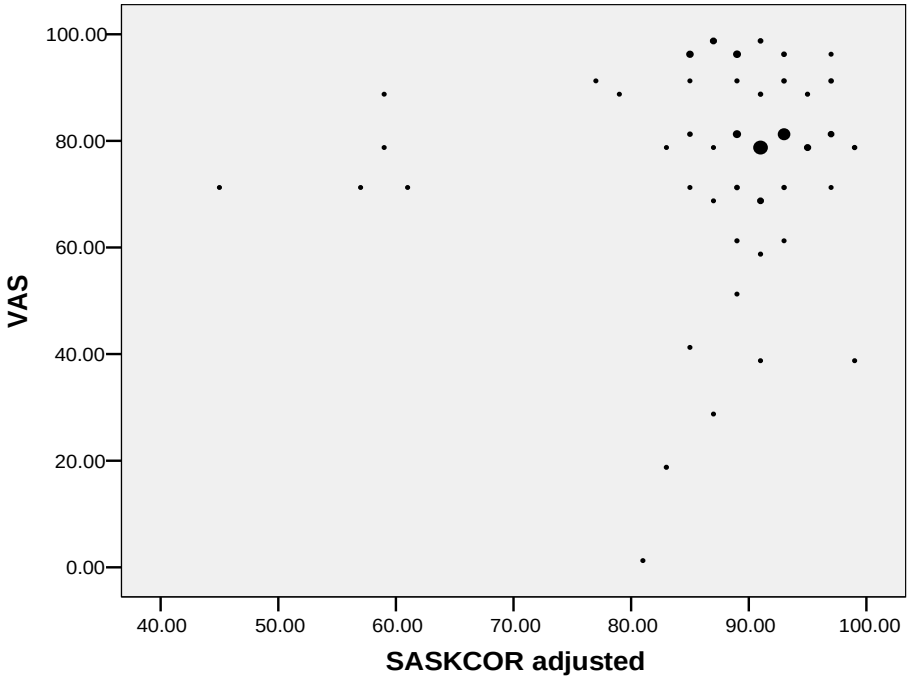


Note: All correlations were positive, as expected, except for the thoracic, vascular – AAA, and vascular CEA priority scores, which were zero or slightly negative.

Three tools, thoracic, vascular – AAA, and vascular – CEA, had zero or negative correlations. Scatterplots were used to explore the reasons. As seen in Figure 6, the majority of cases are found in the upper right hand corner; 95% had a VAS urgency >6. This may be accounted for by the fact that 90% of thoracic cases were cancer. It is

interesting to note that the thoracic tool does not assess life expectancy. Similarly the scatterplot for the vascular – AAA and CEA showed a skewed distribution with a limited range of scores; most of the data points were found in the upper end of both scales (results not shown).

Figure 6 Scatterplot of the Thoracic SASKCOR adjusted and VAS Urgency

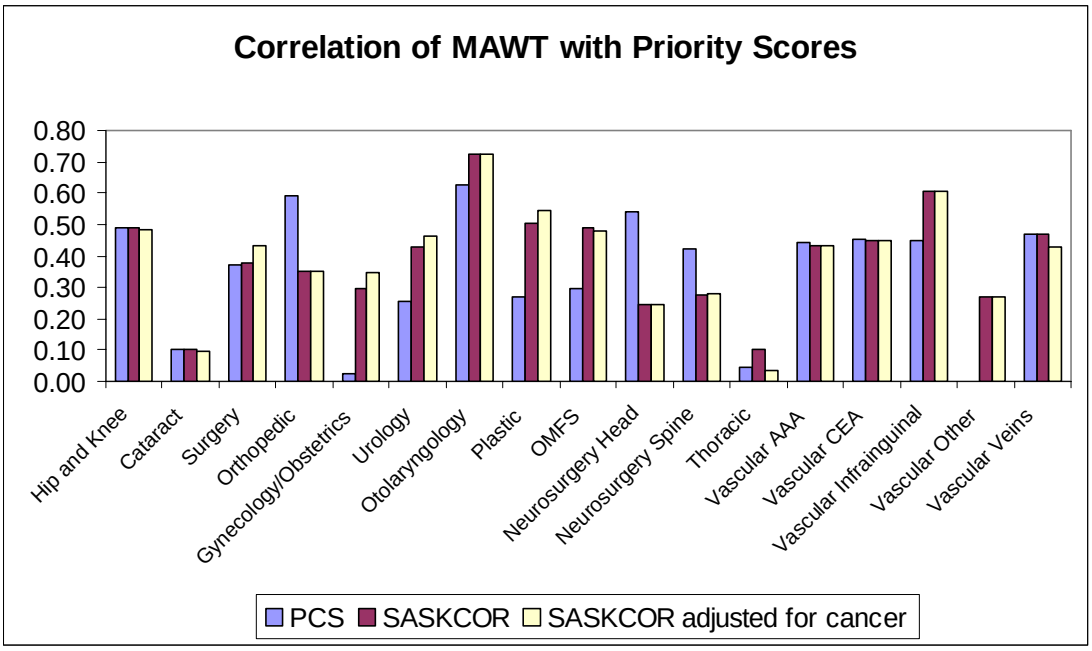


Note: larger circles represent more cases

Figure 7 shows the correlation of the MAWT with the three priority scores. All of the correlations were in the expected direction (i.e., negative) except the correlation between the MAWT and PCS for the vascular – other score (there was a limited range of MAWT values and the sample size was only 15). Correlations between the PCS and MAWT were negative (as expected) and 0.4 or stronger (rounded to one decimal point) for 10 of the scores: hip and knee replacement, general surgery, orthopedics, otolaryngology, neurosurgery – head and spine, vascular – AAA, CEA, infrainguinal, and veins. Correlations between the SASKCOR adjusted were negative and 0.4 or stronger for 10 of the tools: hip and knee replacement, general surgery, urology, otolaryngology, OMFS,

plastics, and vascular – AAA, CEA, infrainguinal, and veins. A comparision of the correlations of MAWT with the PCS vs. the SASKCOR adjusted showed that there was 0.3 or less of a difference across all of the scores, except for vascular – other.

Figure 7 The Correlation of Maximum Acceptable Waiting Time with Priority Scores



Note: Correlations are absolute values. All correlations were negative, as expected, except for the Vascular – other correlation of the PCS and MAWT (value of 0).

The Relationship of Priority Scores to Urgency Categories for Saskatoon and Regina

Urgency category data were available for 21% of Regina cases and 95% of Saskatoon cases. The correlations between the urgency categories and the priority scores were higher for the 4 level Saskatoon categories (cancer, urgent, urgent2, elective) than for the 2 level Regina categories (urgent vs. elective) and highest for the SASKCOR adjusted for both Saskatoon and Regina (Table 11). It should be noted that the Regina data has an uneven distribution of cases in the two urgency categories (5% urgent, 95% elective), thereby attenuating the correlations. When the analysis was split by cases waiting vs. post surgery for the Saskatoon data, the correlations showed a different pattern (Table 12). For cases waiting, the correlations between the PCS and urgency category were 0.56 compared with 0.21 for post-surgery cases, and for the SASKCOR adjusted, 0.53 and 0.62, respectively. Figures 8 to 11 show the distribution of priority scores for Saskatoon and Regina urgency categories for cases waiting and post-surgery. Appendix I includes the distributions of the priority scores for each tool by the relevant urgency categories for Saskatoon and Regina.

Table 11 Correlation Coefficients between Priority Scores and Urgency Categories

Priority Score	*Urgency Categories*	
	Saskatoon	Regina
PCS	0.34	0.12
SASKCOR	0.60	0.33
SASKCOR adjusted	0.68	0.35

Table 12 Correlation Coefficients between Priority Scores and Urgency Categories for Saskatoon for Cases Waiting vs. Cases Post-Surgery

Status	*Priority Score*	*Correlation*
Waiting	PCS	0.56
	SASKCOR	0.51
	SASKCOR adjusted	0.53
Post-surgery	PCS	0.21
	SASKCOR	0.48
	SASKCOR adjusted	0.62

Figure 8 Boxplots of priority scores for Urgency Levels for Saskatoon – Cases Waiting

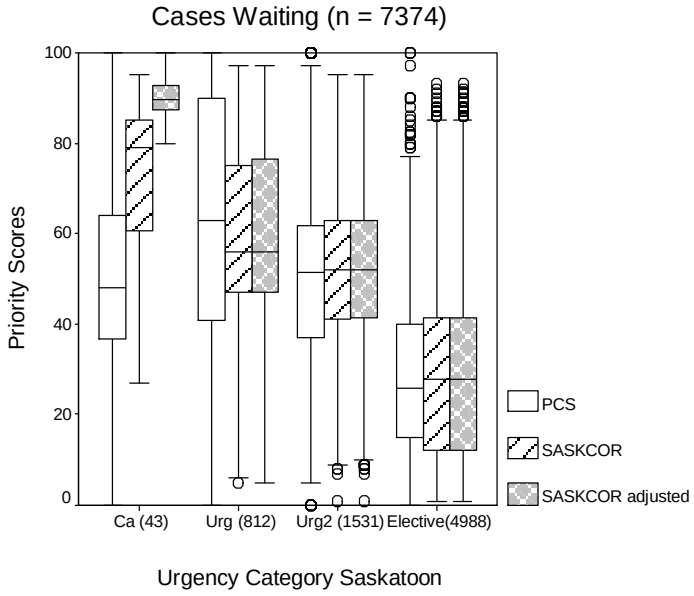


Figure 9 Boxplots of priority scores for Urgency Levels for Saskatoon – Cases Post-surgery

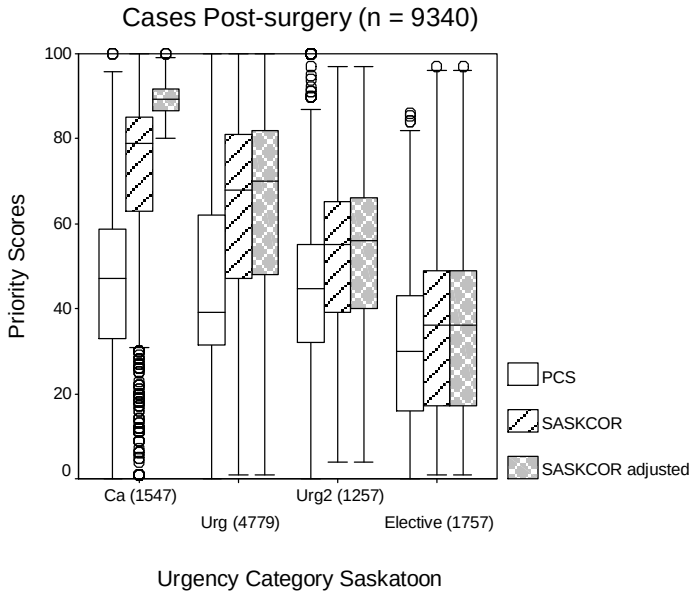


Figure 10 Boxplots of priority scores for Urgency Levels for Regina – Cases Waiting

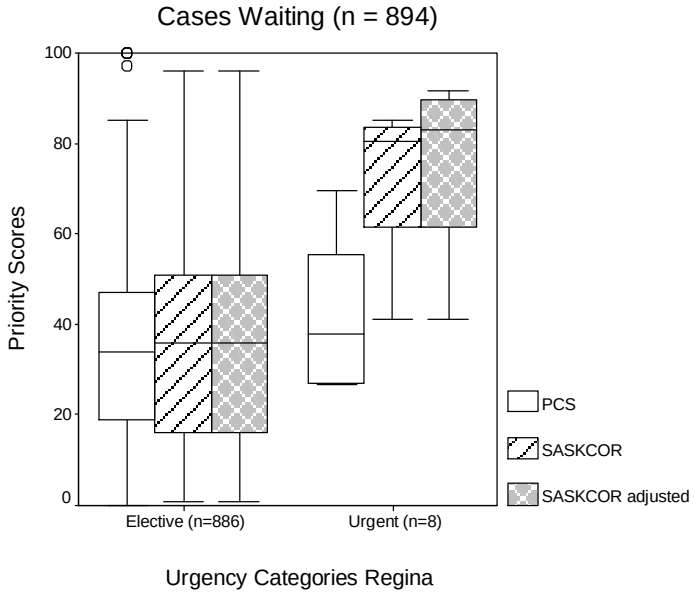
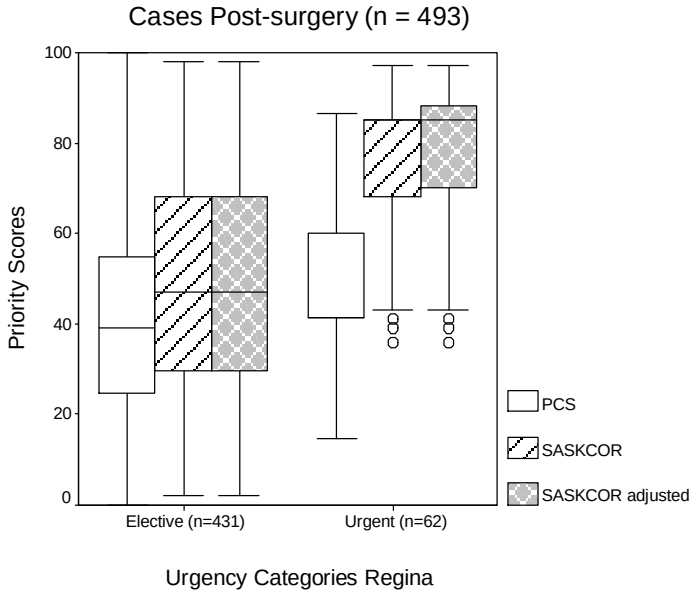


Figure 11 Boxplots of priority scores for Urgency Levels for Regina – Cases Post-surgery



Target waiting times

Table 13 shows the distribution of target time frames for each priority score. In Figure 12 target time frames were grouped into three categories: < 3 months, 3 – 6 months, and > 6 months. Seven of the scores had target time frames of 3 months or less for at least 80% of the cases: Neurosurgery – head and spine, thoracic, and VAS – AAA, CEA, infrainguinal, and other aneurysm. In contrast, 89% of the cases for VAS – veins had a target time frame of over 6 months. It is important to note that although the priority scores for Thoracic, Vascular AAA, and Vascular CEA surgery were unrelated to the VAS urgency, the use of urgency profiles resulted in target waiting times of within 3 months or less for the majority of cases.

Table 13 The Frequency and Percentage of Levels of Target Time Frames for Each Priority Score

PriorityTool	*<3wks*		*3 wks - 6 wks*		*6 wks - 3 m*		*3 m - 6 m*		*> 6 m*	
	Count	%	Count	%	Count	%	Count	%	Count	%
Hip and Knee	95	5	191	9	546	26	1113	54	131	6
Cataract	38	1	135	3	303	7	1654	37	2311	52
Surgery	1853	31	543	9	967	16	2191	36	504	8
Orthopedic	633	15	788	19	713	17	1235	30	761	18
Gyne/Obs	1641	27	1111	18	1681	28	1076	18	582	10
Urology	854	35	338	14	765	31	319	13	194	8
Otolaryngology	909	27	186	6	61	2	229	7	1971	59
OMFS	3	0	19	3	25	4	509	73	145	21
Plastic	244	13	120	6	130	7	347	19	1030	55
Neursurgery Head	70	81	7	8	1	1	8	9	0	0
Neurosurgery Spine	4	1	425	74	86	15	59	10	0	0
Thoracic	265	96	4	1	6	2	2	1	0	0
Vascular AAA	18	38	29	62	0	0	0	0	0	0
Vascular CEA	15	24	20	32	17	27	10	16	0	0
Vascular Infrainguinal	40	46	34	39	13	15	0	0	0	0
Vascular Other	7	28	17	68	1	4	0	0	0	0
Vascular Veins	1	1	0	0	0	0	19	10	161	89

Figure 12 The Percentage of Cases in 3 Groups of Target Time Frames

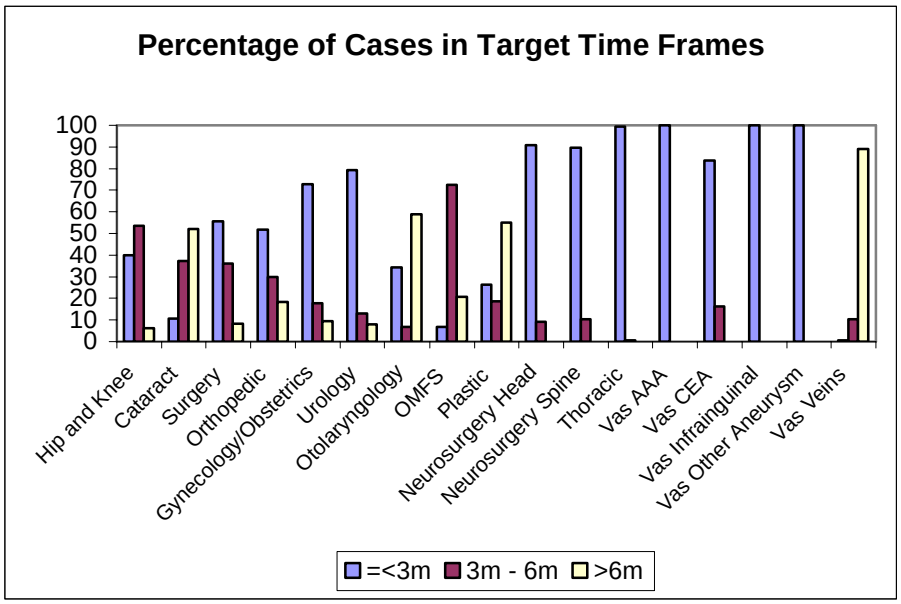
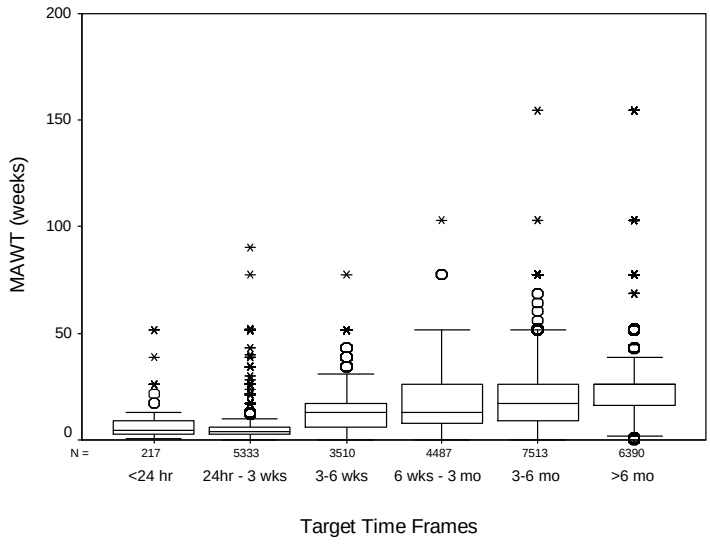


Figure 13 shows a positive relationship between MAWT and the target time frames. Appendix J shows the relationship between MAWT and the target time frame for each of the tools.

Figure 13 The Distribution of Maximum Acceptable Waiting Time for Target Time Frames



Note: The median MAWT for the target time frame of >6 months is 26 months.

Known Groups Validity

Figure 14 shows the distribution of scores for the cancer vs. non-cancer patients for the relevant measures (data that included cancer patients). Because the SASKCOR adjusted places all cancer cases in an 80 – 100 urgency profile, the SASKCOR adjusted best differentiated the two groups. T-tests were used to assess mean differences in cancer vs. non-cancer cases for the three priority scores. Only data for tools with at least 20 cases in either the cancer or non-cancer group were analyzed. Results showed that for all of the tools except thoracic, all priority scores (i.e., PCS, SASKCOR, and SASKCOR adjusted) were significantly higher for the cancer group. In most cases the mean difference for the SASKCOR adjusted was higher than the mean difference for the SASKCOR and the PCS by approximately 10 – 50 points. For the thoracic tool, the SASKCOR adjusted was significantly higher for the cancer cases, the SASKCOR was not significantly different, and the PCS was significantly lower for cancer patients. It should be noted that the thoracic data was different from the other tools in that the majority of cases (90%) were cancer cases. To test whether cancer cases would be ranked above the 75^{th} percentile for priority (i.e., in the most urgent 25% of cases), cases were grouped into 4 groups based on percentiles of the PCS and SASKCOR adjusted. Ninety six percent of the cancer cases scored with the SASKCOR adjusted would be ranked above the 75^{th} percentile, while 45% of cases scored with the PCS would be ranked above the 75^{th} percentile (i.e., in the most urgent 25% of cases).

Figure 14 The Distribution of Priority Scores for Cancer vs. Non-Cancer Cases

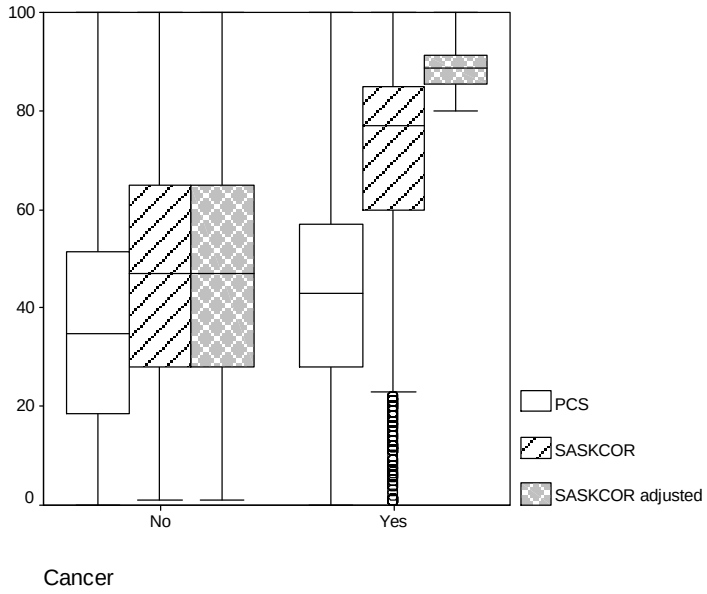


Table 14 Mean Differences in Three Priority Scores for Cancer vs. Non-Cancer Cases

Priority Tool	*Priority Score*	*Mean Difference*[1]	*SE*[2]	*95% Confidence Interval*	
				Lower	Upper
Surgery	PCS*	13.41	0.54	14.47	12.35
	SASKCOR*	28.70	0.59	29.85	27.54
	SASKCOR adjusted*	40.90	0.50	41.88	39.93
Gynecology/Obstetrics	PCS*	7.99	0.95	9.85	6.13
	SASKCOR*	6.09	1.02	8.09	4.10
	SASKCOR adusted*	30.63	1.00	32.59	28.67
Urology	PCS*	8.76	0.93	10.58	6.94
	SASKCOR*	14.60	0.76	16.09	13.12
	SASKCOR adjusted*	35.43	0.68	36.77	34.09
Otolaryngology	PCS*	33.02	1.08	35.14	30.91
	SASKCOR*	17.79	2.69	23.07	12.51
	SASKCOR adjusted*	57.01	2.65	62.21	51.82
Plastic	PCS*	5.13	1.42	7.91	2.35
	SASKCOR*	17.47	2.17	21.73	13.21
	SASKCOR adjusted*	56.08	2.06	60.12	52.04
Neuroloqy Head	PCS*	16.36	4.55	25.41	7.31
	SASKCOR*	11.93	3.89	19.67	4.18
	SASKCOR adjusted*	12.13	3.89	19.86	4.39
Thoracic	PCS*	-11.30	3.31	-4.78	-17.82
	SASKCOR	-4.91	2.96	0.92	-10.73
	SASKCOR adjusted*	8.20	1.07	10.30	6.10

Note: Only tools with a minimum of 20 cases in each group (cancer or non-cancer) were used for the analysis.

[1] mean difference in priority score = cancer minus non-cancer

[2] standard error of the mean difference

T-test showed a statistically significant difference <.05

Summary of Findings

Description of the Sample

- Results were based on 32,527 cases who were either waiting (45%) or who were post surgery (55%).
- Neurosurgery (head) had the highest median priority scores while otolaryngology and vascular – veins had the lowest.
- The median Vas Urgency ranged from 30 (Vascular – veins) to 80 (neurosurgery, thoracic, and vascular – all except veins).
- The median MAWT ranged from 3 weeks (thoracic) to 26 weeks (cataract, otolaryngology, OMFS, and vascular – veins).
- For most of the tools, the addition of the urgency profile to the PCS (i.e., SASKCOR) shifted the distribution upwards (i.e., more urgent).

Convergent validity

- Convergent validity correlation coefficients were similar using the PCS and SASKCOR adjusted.
- Convergent correlations between the priority scores and VAS urgency were positive, as expected, with the exception of the thoracic priority score and two of the vascular priority scores, aortic aneurysm and carotid endarderectomy. The three scores were characterized by a limited range of scores of higher urgency and conditions that had life-expectancy implications.
- Convergent validity correlations between the priority scores and VAS Urgency were 0.5 or stronger for 10 of 17 (PCS) and 7 of 17 (SASKCOR adjusted) priority scores.
- Correlations between the priority scores and MAWT were negative, as expected, and 0.4 or stronger for 10 of 17 of the priority scores for both the PCS and SASKCOR adjusted.
- The correlations of the priority scores with the Saskatoon (4 levels) and Regina (2 levels) urgency categories differed for cases waiting and post-surgery. For

Saskatoon, the correlations ranged from 0.56 (PCS) to 0.53 (SASKCOR adjusted) for cases waiting, and from 0.21 (PCS) to 0.62 (SASKCOR adjusted) for post-surgery cases.

Known Groups Differences Validity

- T-tests showed that for all of the tools except thoracic, all priority scores (PCS, SASKCOR, and SASKCOR adjusted) were significantly higher for the cancer cases than the non-cancer cases.
- In most cases the mean difference for the SASKCOR adjusted was higher than the SASKCOR or the PCS for cancer cases by approximately 10 – 50 points.
- The SASKCOR adjusted result in the greatest differentiation between cancer and non-cancer cases as cancer cases have an urgency profile of 80 – 100.
- The SASKCOR adjusted ranked 96% of all cancer patients above the 75^{th} percentile of priority scores, while the PCS ranked 45% of cancer patients above the 75^{th} percentile (for services that included cancer patients).

DISCUSSION, CONCLUSIONS, AND RECOMMENDATIONS

This report provides a broad overview of the validity of a set of priority scores adapted from the WCWL General Surgery tool. Also included in the analysis are the three WCWL tools. The priority scores were designed to assess patient urgency for surgery for specific populations. The evaluation is based on the assumption that the scores are intended to compare patients within specialties rather than across specialties. Both a conceptual analysis and empirical evidence were used to assess validity. Validity evidence was examined in terms of three components: content, the scoring model, and external validity. A key difference in the WCWL tools and the Saskatchewan tools are in their intended use. The WCWL priority scores were designed specifically for scheduled procedures. The SASKCOR adjusted was designed primarily for scheduled procedures but urgent and emergency conditions are also included in the vascular tool.

Content

A content analysis was based on a comparison of item content and an examination of item clarity and the relevance and representativeness of the items to the underlying construct the tool was designed to measure (i.e., patient urgency).

The WCWL priority tools were designed to measure patient urgency for elective services based on two underlying constructs: severity and capacity to benefit. The WCWL general surgery tool includes measures of both constructs, while the hip and knee replacement and cataract tools assess severity but not capacity to benefit as it is assumed that patients will benefit from the procedures. As the Saskatchewan priority tools were adapted from the WCWL General Surgery Tool, much of the content is the same or similar. However there are differences. Although all of the priority tools include aspects of HRQL, not all include life expectancy criteria or social factors. It is important to note that the thoracic tool has no life expectancy criteria, yet a large proportion of cases had a proven or suspected cancer diagnosis. These differences in tool content suggest that the underlying concept of urgency varies across the tools.

Although the tools measure many of the same concepts, slight variations in wording for the same underlying attribute make it more difficult to compare common content across tools. In addition, because of differences in weighting, the same criteria provide different proportions of the weighted priority score. Some of the item content overlaps and this could affect the interpretability and reliability of scores.

The Scoring Model

Two main methods of scoring were compared: the summative weighted score (PCS) and the PCS in combination with procedure-specific urgency profiles, including cancer (SASKCOR adjusted).

The distributions of priority scores varied across the tools. For example, an individual with a SASKCOR adjusted of 55 would be in the 25% most urgent group for Plastic Surgery and in the 25% least urgent group for Neurosurgery – spine. However, the SASKCOR adjusted is linked to a common scale of target waiting times. An individual with a SASKCOR adjusted of 55 would have a target waiting time of '80% within 3 months' regardless of the priority tool used to generate the score.

A more in-depth analysis was done with the general surgery tool and the five tools that have undergone reliability testing. A factor analysis showed that five of the tools had more than one factor. An exception was the orthopedic tool with a single underlying factor. The hip and knee orthopedic tool also showed a single factor (results not shown). This supports the underlying conceptual basis that priority-setting tools are multidimensional (11;19). Generally, life expectancy and HRQL items were weakly related and they loaded on separate factors.

One of the assumptions of an additive scale is that items are measuring the same underlying attribute (10). When the underlying construct is multidimensional, an additive score is more difficult to interpret. For example a patient with a score of 50

could score high on symptoms and low on life-expectancy implications or low on symptoms and high on life-expectancy implications. As one of the functions of priority criteria is to develop case-mix descriptions of patients on waiting lists (20;21), a profile of scores (or subscale scores), in addition to the total summary priority score, may be useful to consider (e.g., a HRQL score and a life-expectancy score).

For the six selected tools, a correlational analysis showed that approximately 18% to 42% of the variance in the SASKCOR adjusted can be explained by the PCS. Thus, patients would be ranked differently using the two scoring systems. A comparison of the distributions of the VAS Urgency and priority scores for the more common procedures showed that for the procedures with a small range of high or low urgency profiles (such as 85 – 95 or 1 – 29) the distributions of the SASKCOR adjusted and VAS urgency were generally congruent (i.e., a higher urgency procedure had a higher median VAS urgency). However, there were some exceptions. It is important to identify them and explore the reason for the discrepancy. A factor analysis of the six tools supported the conceptual basis for priority tools as multidimensional.

Both the PCS and SASKCOR adjusted showed a higher mean score for cancer than for non-cancer patients. However, without a cancer urgency profile, some procedures, such as breast biopsy, would have a full range (0 – 100) of PCS values. Urgency profiles do ensure that patients having procedures that are considered high urgency (e.g., cancer or myringotomy with tubes) have target time frames consistent with the urgency.

External Validity

The priority scores were designed to capture the clinical judgement of patient urgency. Although there is no gold standard for patient urgency, one way of assessing convergent validity is to compare the priority scores to other measures of urgency. These urgency measures included the VAS Urgency, the MAWT, and the urgency categories for Saskatoon and Regina. In addition, the target time frames that were linked to the SASKCOR adjusted were compared to the MAWT.

As hypothesized, correlations between the priority scores and VAS urgency were 0.5 or greater for 6 of the tools for both the PCS and SASKCOR adjusted. Thus, the convergent validity of these priority scores is supported. Most correlations were similar using the PCS and the SASKCOR adjusted. However, it is not clear which of the scoring methods is a more accurate reflection of patient urgency.

Study Limitations

The number of cases for neurology – head and all of the vascular priority scores except veins was less than 100. Therefore, results for these scores should be interpreted with caution. There were different patterns of correlations between the priority scores and Saskatoon urgency categories for cases waiting vs. cases post-surgery. Feedback from the SSCN and WCWL Research and Evaluation Working Group Committee indicated that the difference could be due to possible changes to the urgency categories (with or without a concurrent completion of the priority tool) when surgery is imminent. These differences influence the interpretability of validity findings as it is not known which urgency categories are a more accurate indicator of the actual urgency of the patient and data are not verifiable.

The limitations of the VAS Urgency and the MAWT as tests of convergent validity are due to factors that could both increase and decrease the convergent correlations, thus affecting the interpretability of results. For example, the completion of the priority criteria items could influence both the VAS urgency and the MAWT ratings. Factors that are known to attenuate correlations such as limited range and skewness, were present in some of the scores. Sources of measurement error (unreliability) in any of the measures would decrease the correlations. For example, surgeons do not necessarily use the same range of the VAS Urgency. Furthermore, the VAS urgency and MAWT could be influenced by local area conditions such as actual waiting time (22;23). A strength of the VAS Urgency is that it is a second measure of the clinical judgement of urgency that takes little time to complete. Although a VAS has been used as a priority-setting tool for general surgery in parts of New Zealand, it lacks transparency, explicitness, and

standardization (24;25). Other potential factors that could affect convergent validity coefficients are interpretation of the priority criteria, item content, a heterogeneous set of priority criteria, and scoring methods.

Validity testing is a continuous process of evaluating evidence over time. Assessing the effectiveness of priority setting as a method to manage patient waiting lists will require an evaluation of the actual use of priority scores as they are implemented. Potential benefits of using priority scores in the management of waiting times include transparency, explicitness, treatment in order of clinical need, and fairness. Future research should include an assessment of the appropriateness of the tools for different age groups, an assessment of the use of the target time frames in practice, and an assessment of the relationships between patient urgency, length of waiting time, and patient benefit.

CONCLUSIONS AND RECOMMENDATIONS

The conclusions and recommendations contained herein represent the consensus of opinion of the members of the SSCN and WCWL Research and Evaluation Working Group following a review and discussion of the results.

Overall, the findings support the validity of the PCS and the SASKCOR adjusted for most of the priority scores, but results are not consistent for all of the scores. Because priority scores have different distributions and are based on content and weights specific to each score, individual priority scores are more interpretable when compared to priority scores generated with the same measures. This is consistent with the underlying assumption that priority scores are intended to compare patients within specialties rather than across specialties.

The PCS and the SASKCOR adjusted show similar convergent correlations with the VAS Urgency and MAWT for most of the tools. However, it is not clear which of the scoring methods is a more accurate reflection of patient urgency. Urgency profiles ensure that patients having procedures that are considered high urgency (e.g., suspected or proven

cancer cases, myringotomy with tubes, aortic aneurysm) have target waiting times consistent with the urgency.

Recommendations

1. There is sufficient support for the validity of the priority scores to move forward with the implementation of 9 tools: hip and knee replacement, cataract, general surgery, orthopedics, gynecology/obstetrics, urology, plastic survey, OMFS, and neurosurgery (head and spine).
2. Three tools need review and possible revision: otolaryngology, neurosurgery, and vascular.
3. Consistent wording for common questions should be considered.
4. A user guide with definitions for each criterion would support a consistent interpretation of priority criteria items.
5. The validity evidence presented in this report is an important first step but it is recommended that the evaluation and monitoring of the validity and usefulness of priority scores continue after the priority scores and target waiting times are implemented in practice.

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