Validation of a Maternal Risk Index Across Multiple Counties

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Background:

Given the current fiscal constraints and high demand for public health nursing services, it is becoming increasingly important to allocate resources to maximize efficiency and effectiveness of care. Data-based allocation of care is desired and expected with the use of electronic health record assessments to provide evidence that informs practice.

Purpose:

The purpose of this study was to validate the Maternal Risk Index. This was completed by:

- Utilizing Omaha System assessments
- Applying the Maternal Risk Index to four counties
- Comparing the Maternal Risk Index across counties to Outcome Attainment

The Maternal Risk Index was developed in a previous study to describe high risk and low risk mothers receiving family home visits.

Design and Sample:

Retrospective cohort design. De-identified secondary datasets from rural and urban counties. Inclusion criteria included being pregnant or postpartum and/or parenting.

Method:

The Maternal Risk Index formula was applied to datasets from four counties. Descriptive statistics were used to determine the mean baseline and outcome scores. Ordered logistic regression was applied with SAS 9.2™ software to assess the relationship between Maternal Risk Index and attaining the best possible outcome score (4 or 5 on a 1 to 5 scale).

Maternal Risk Index:

$$\underline{\{1 * (Pr + PP + Pa) + 2 * (SU + Ab + MH + Co + In)\}}$$
$$\text{(Avg. baseline K score for all 8 problems)}$$

Pr – Pregnancy	SU – Substance Use	Co – Cognition
PP – Post-Partum	Ab – Abuse	In – Income
Pa – Parenting	MH – Mental Health	K – Knowledge

Results:

Knowledge Outcome

	Odds Ratio	Lower CL	Upper CL	p-value
County A	0.449	0.361	0.557	<0.001*
County B	0.403	0.219	0.740	0.0034*
County C	0.487	0.420	0.566	<0.0001*
County D	0.429	0.321	0.572	<0.0001*

Behavior Outcome

	Odds Ratio	Lower CL	Upper CL	p-value
County A	0.451	0.348	0.585	<0.0001*
County B	0.436	0.244	0.779	0.0051*
County C	0.456	0.389	0.534	<0.0001*
County D	0.570	0.443	0.734	<0.0001*

Status Outcome

	Odds Ratio	Lower CL	Upper CL	p-value
County A	1.054	0.746	1.489	0.7643
County B	0.490	0.274	0.876	0.0161*
County C	0.527	0.441	0.630	<0.0001*
County D	0.741	0.581	0.945	0.0155*

Table: 1: Association between Maternal Risk Index and Outcome Attainment

	Average Risk Index	Range of Risk Indexes		Risk Index at which 50% reach **Knowledge** benchmark	Risk Index at which 50% reach **Behavior** benchmark	Risk Index at which 50% reach **Status** benchmark
County A	2.76	0.25	7.7	2.5	2.67	2.5
County B	0.99	0.25	4.57	0.4	0.67	0.67
County C	1.78	0.25	9	1.2	1.33	1.5
County D	1.71	0.25	5	0.67	1.25	1.5

Table: 2: Average Maternal Risk Index at which Benchmark (Desired Outcome) is Attained

Discussion:

There are statistically significant differences in the Maternal Risk Index between those who attain a post-intervention (knowledge, behavior or status) score of 4 (best outcome) and those who do not.

Knowledge Outcome: With a unit increase in Maternal Risk Index, the odds of having a post-intervention knowledge score of 4 decreases by at least 51% (County C) – and at most 60% (County B).

Behavior Outcome: With a unit increase in Maternal Risk Index, the odds of having a post-intervention behavior score of 4 decreases by at least 43% (County D) – and at most 56% (County B).

Status Outcome: With a unit increase in Maternal risk Index, the odds of having a post-intervention status score of 4 decreases by at least 26% (County D) – and at most 42% (County B). County A did not show significant results.

The Maternal Risk Index was consistent across counties in predicting knowledge and behavior outcomes. This supports the validation of this tool as viable metric for use in practice.

Conclusions:

The Maternal Risk Index discriminated meaningfully between clients who attained benchmarks and those who did not. The Maternal Risk Index may also be a valuable tool to forecast length and intensity of service.