

# Factor analysis to validate a survey evaluating cultural competence in maternity care for Indigenous women

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## KEY WORDS

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## ABSTRACT

### Objective

This research set out to develop and validate a tool to assess the self-reported progress of Australian publicly funded maternity services towards the goal of culturally competent maternity care for Indigenous women. The tool aimed to measure the degree to which these services had incorporated actions towards achieving 14 identified characteristics into the current fabric of their organisation.

### Design

An online exploratory survey was distributed to consenting respondents nationally.

### Setting

Public maternity services in each State and Territory of Australia.

### Subjects

The survey was distributed to 149 public maternity organisations, with 85 organisational consents and 44 respondents completing the survey.

### Main outcome measure

Construct validity of a survey designed to describe progress in working towards organisational cultural competence in maternity services was assessed by principal factor analysis and varimax with Kaiser rotation.

### Results

The results support the two subscales identified as appropriate groups of questions to address 1) assessment of cultural competence and 2) assessment of the survey. Reliability was assessed by Cronbach's reliability and results established evidence of a reliable survey.

### Conclusion

The results of this study show that the survey assessing and identifying organisational cultural competence in public maternity care for Indigenous women demonstrated acceptable reliability and validity for a newly developed instrument. Responses to the survey provided participants of this study with a baseline for assessing further progress. Upon further testing and refinement, the survey can provide a validated tool to guide both national and local activity to improve the maternity experiences of Indigenous women.

## INTRODUCTION

Aboriginal and Torres Strait Islander mothers and babies experience higher rates of mortality and morbidity compared to non-Indigenous women and babies. In 2010, the Australian Health Minister's Advisory Council (AHMAC) commissioned research to identify the characteristics of culturally competent maternity care for Aboriginal and Torres Strait Islander people (Kruske, 2012) as an action under the National Maternity Services Plan (NMSP) (AHMAC 2011). Using a literature review and stakeholder consultations, Kruske identified 14 characteristics of effective culturally competent care in maternity services including:

1. Physical environment and infrastructure
2. Specific Aboriginal and/or Torres Strait Islander programs
3. Aboriginal and Torres Strait Islander workforce
4. Continuity of care and carer
5. Collaborating with Aboriginal Community Controlled Health Organisations and other agencies
6. Communication, information technology and transfer of care
7. Staff attitudes and respect
8. Cultural education programs
9. Relationships
10. Informed choice and right of refusal
11. Tools to measure cultural competence
12. Culture specific guidelines
13. Culturally appropriate and effective health promotion and behaviour change activities
14. Engaging consumers and clinical governance.

Kruske's (2012) research emphasised that the indicators identified were preliminary in nature, requiring future development and testing in line with 'middle year' activities of the five year NMSP. Developing a tool based on the 14 identified characteristics and using this tool to conduct a national survey to assess organisational cultural competency was subsequently endorsed by AHMAC for fulfilling the middle years activity of conducting a national stocktake of access to culturally competent maternity care for Aboriginal and Torres Strait Islander women.

Although population data identifies that the highest concentration of Indigenous people is in urban eastern Australia, the percentage of Aboriginal and Torres Strait Islander people within individual populations rises with increasing remoteness. With the highest proportion of people within its population who identify as Aboriginal and Torres Strait Islander people (30% compared to 1 – 3% in other Australian jurisdictions), improving the experiences of Aboriginal women is a key priority for the Northern Territory Department of Health. This jurisdiction volunteered to facilitate the research on behalf of all AHMAC members. The approach taken to tool development recognised that examining the systems that underpin organisational cultural competence is an essential component of improving the provision of health care to Aboriginal women. At the same time it was recognised that such a tool can only be successfully applied and reliably used if it has validity for the intended purpose.

## Literature

The 14 characteristics of culturally competent maternity care identified by Kruske (2012) were not provided as measurable indicators, nor did Kruske recommend a tool for assessing organisational cultural competency. Although there is much written about individual health practitioner competency and patient experiences of health care, there are however, limited data available for measuring the incidence of institutional racism (Paradies et al 2014; Paradies and Cunningham 2009) or evaluating cultural competence of health services (Suarez-Balcazar et al 2011). More generally, such tools are valuable for enhancing organisational accountability for workplace practices, and to act as a driver to improve the quality of health service provision (Australian Council of Safety and Quality Standards in Health Care, ACSQHC 2017). When used specifically to assess organisational performance in relation to cultural competence, Trenerry et al (2010) argue that auditing and assessment approaches are of significant value for supporting resource development, role-modelling, adoption of positive behaviours and reducing discrimination.

A number of approaches and tools to assess cultural competence have been developed in the last decade; most draw upon earlier work from the United States of America; and most have opted for the self-assessment mode of audit (Kruske 2012; Multicultural Mental Health Australia (MMHA) 2010; Axelby and Rigney 2006a; 2006b). Areas that are audited in these tools include: the presence or absence of a policy framework that acknowledges and recognises cultural diversity and the need for cultural competence, access to tailored and specific services, engagement with culturally diverse populations, employment of people from within a culturally specific population, recognition of cultural diversity within policies, services, recruitment and staff training, and consumer input into services (Bainbridge et al 2015; Cherner et al 2014).

Organisational level self-assessment tools developed for the Australian context include:

1. National Cultural Competency Tool (NCCT) for Mental Health Services, developed for culturally and linguistically diverse (CALD) backgrounds (MMHA 2010);
2. Aboriginal Cultural Competency Self-Assessment Instrument developed for South Australian public sector agencies (Axelby et al 2006a and 2006b);
3. Cultural Competence Assessment Tool Kit developed to measure access/ utilisation of antenatal services by Western Australian Indigenous women (Walker 2010; 2011);
4. Aboriginal Cultural Inclusion Checklist for New South Wales Maternity Services (Office of Kids and Families NSW Health 2016).

Although these cultural competency tools provide an excellent basis for tool development, they are either for contexts broader than the maternity service context (1 and 2), or do not entirely capture the 14 characteristics of organisational cultural competency (3 and 4). Nor has information on interventions to address cultural competency in maternity services been captured at a national level.

Norbeck (1985) suggested that developing a new tool should assess at least one type of content validity, one type of construct validity and two types of reliability. Other researchers (Johnson et al 2014) have used retrospective validation and previous literature as a basis for developing a tool that can be used by clinicians. One study (Mbuagbaw et al 2014) used content validity, construct validity and test-retest reliability in development of a tool to assess health competence as a measurement of the public's health and recommends further validation of their tool by using the tool in many populations and settings.

## METHODS

The tool developed in this study for assessing organisational cultural competence set out to address each of the criteria identified by Norbeck (1985), and incorporated the experiences of Johnson et al (2014) and Mbuagbaw et al (2014). This process was guided by an expert reference group of midwives and Aboriginal and Torres Strait Islander spokespersons respected in each Australian jurisdiction for their ability to contribute an Indigenous voice to health policy. This group provided professional and Indigenous governance respectively for the entire project providing input into tool development, advising on data collection, and reviewing and advising on the interpretation and reporting of results.

The survey was structured in three sections. Section one was designed to obtain demographic information to describe the population and settings where the tool was used and also as potential variables influencing progress towards achieving the identified characteristics. Section two included questions relating to a self-assessment of the degree to which health service delivery reflects the characteristics of culturally competent maternity care. Section three consisted of questions relating to the length, format and perceived consistency, clarity, and benefit of the self-assessment tool.

Section two development began with formulating questions that measured practical progress against the 14 characteristics that Kruske (2012) had suggested were suitable for future use within a cyclical tool for assessing organisational cultural competence. The research also took the approach that cultural competence, along with its contributory elements of cultural security and cultural responsiveness are one way to create a culturally safe environment for Aboriginal and Torres Strait Islander women and that cultural competence is a developmental process that evolves over an extended period. Accordingly, it was hypothesized that organisations would be at various levels of awareness, knowledge and skills along the cultural competence continuum. Survey questions were framed with this continuum in mind, using a four point Likert scale for participants to record responses that included: no progress or yet to begin achieving this goal; some progress towards this goal; almost fully achieving this goal; successful in achieving this goal. Five open ended questions were also included to probe more deeply the criteria organisations used for identifying cultural competence of actual and potential employees; the engagement, employment, and support for Aboriginal and Torres Strait Islander people in their workforce overall and cultural competence training and service design and delivery specifically.

Four options were used in section three to evaluate usability of the tool; asking respondents to rate design elements as extremely good, good, adequate, and less than adequate.

The tool was piloted to test reliability in two maternity services (one in Northern Australia and one in Southern Australia) that were not eligible to participate in the national sample. As the survey was newly developed for this particular project, reliability was assessed using test-retest reliability and Cronbach's alpha. With a correlation of 1.0 and statistically significant ( $p < 0.01$ ) for test-retest and Cronbach's reliability being a coefficient alpha of 0.94, the pilot scores showed good reliability. Face validity was verified by distribution to expert stakeholders from three states of Australia including a specific Aboriginal Health and Wellbeing unit.

The research was approved by multiple Human Research Ethics Committees with shared and individual authorities under the national network covering all Australian States and Territories. Also included in this network were Aboriginal and Torres Strait Islander sub-committees, research governance committees at health network and health service levels, and site specific assessments. This process did not result in any further amendments to the survey. Likert tool items for sections two and three suitable for statistical validation are presented in tables 1 and 2. Open ended questions are not discussed in this paper.

**Table 1: Cultural competency subscale**

Cultural Competence	No progress	Some progress	Almost fully achieving	Successful
1. Does your organisation actively recruit Aboriginal and / or Torres Strait Islander employees?				
2. Does your organisation specify cultural competence and compliance with cultural competence / policy guidelines as selection criteria for employee recruitment?				
3. Does your organisation have guidelines and policies specific to Aboriginal and / or Torres Strait Islander maternity care and / or support culturally competent care for Aboriginal and / or Torres Strait Islander people?				
4. Does your organisation provide educational resources designed specifically for Aboriginal and Torres Strait Islander women?				
5. Does your organisation display the Aboriginal or Torres Strait Islander artwork and / or flags?				
6. Does your organisation provide antenatal records through to discharge summaries to all relevant stakeholders including Aboriginal and / or Torres Strait Islander women?				
7. Does your organisation collect data on which services Aboriginal and /or Torres Strait Islander women use within your maternity services?				
8. Does your organisation report on evaluation of maternity outcomes for Aboriginal and / or Torres Strait Islander women as a specific cohort?				
9. Overall, how culturally competent would you rate your maternity services in relation to Aboriginal and / or Torres Strait Islander people?				
10. Does your service encourage family members to accompany and support Aboriginal and / or Torres Strait Islander women?	Never	Proportion of staff sometimes	Proportion of staff all times	All staff all times
11. Does your organisation involve Aboriginal and / or Torres Strait Islander women in design and implementation of health promotion activities and programs, for example, cessation or reduction of smoking in pregnancy?	No progress	Some progress	Almost fully achieving this goal	Successful

**Table 2: Assessment of survey subscale**

Assessment of tool	Extremely good	Good	Adequate	Less than adequate
12. How would you rate the format of this survey in terms of ease of use?				
13. How would you rate the clarity of these questions in this survey?				
14. How would you rate the consistency of the questions posed in this survey with the aim of this project?				
15. How would you rate the benefit of completing this survey as a self-assessment tool?				

Maternity services were defined for this project as services that provide care including any or all elements across the continuum of antenatal, intrapartum (birthing) and postnatal periods. Public sector maternity services for populations greater than 1,000 people were eligible to participate. Excluding services providing care to populations less than 1,000 people was based on minimizing the possibility of identification of an individual service and the likelihood that the number of Aboriginal and Torres Strait Islander women receiving care in these services is low and intermittent. Such a profile was considered likely to negatively affect the validity and reliability of self-assessment.

Recruitment of participants was a three step process. Without a national database of maternity services, a convenience sample of 149 eligible organisations and relevant executive contact persons were identified by senior government midwifery advisors in each jurisdiction. Executives provided organisational consent and delegated responsibility to complete the survey to a person best equipped to respond on behalf of the health service. Consenting organisational representatives were emailed a web link to access, complete and submit the survey anonymously. The survey could also be downloaded immediately after completion and used internally as feedback on progress and as a tool to guide immediate initiatives for service improvement.

Analysis was a stepped process that was calculated in Statistical Package for Social Sciences (SPSS), Version 24. The Bartlett test was used to determine if factor analysis is an appropriate analysis for this specific sample. The Kaiser-Meyer Olkin method and communalities determined the adequacy of the sample size.

Principal component analysis to extract factors was used in the first instance. Principal component analysis is related to the sample collected. Generally speaking, generalisation of results can only be achieved if using different samples that reveal the same factor structure. Principal component analysis is at best a common factor analysis that decomposes an original data set into a set of linear variates that are less complex than factor analysis that composes a mathematical model (Field 2013). Principal component scores are actual scores whereas factor scores are estimates of underlying latent constructs (Suhr 2005). Factor loadings are identified by groupings of the questions relating to a particular theme. The final decision about what questions belong to which group or theme is made by the researcher, being guided by this factor loading output of principal component analysis.

As factors were deemed independent, orthogonal varimax with Kaiser rotation was used to improve interpretability of the factors and further refine the groupings of questions. The final step revealed the eigenvalues that identify those factors that are most substantially important. Factor analysis enables identification of common underlying dimensions and in this way common variance is established and factors explain this variance by using eigenvalues (Field 2013).

## FINDINGS

Organisational consent to participate in the study was received from 85 of the 149 eligible health services, representing a response rate of 57%, and included representation from all jurisdictions. Of the 85 maternity services who agreed to participate, 44 surveys were completed by nominated representatives, representing a response rate of 51.8% compared to organisational consent, and an overall response rate of 29.5%.

In the main study, principal component analysis was conducted to assess construct validity of specific questions for the two subscales (cultural competence and assessment of survey) to determine the appropriate domains and constructs so that the survey can be used for future cyclical use. Means and standard deviations are presented in table 3. The mean scores report a composite score for each individual on a particular factor and one of the simplest ways to estimate factor scores for each respondent involves totalling raw scores corresponding to all questions loading on a factor and additionally, summed factor scores preserve variation in the original data (DiStefano et al 2009).

**Table 3: Survey Item Means and Standard Deviations**

Survey Item Means and Standard Deviations				
No.	Question	<i>n</i>	<i>M</i>	<i>SD</i>
1	Recruitment of Aboriginal and / or Torres Strait Islander employees	42	2.31	.95
2	Specification of cultural competence in policies as selection criteria for employee recruitment	42	2.33	1.1
3	Guidelines and policies specific to Aboriginal and / or Torres Strait Islander maternity care and / or support culturally competent care	42	2.26	1.1
4	Providing educational resources	42	2.55	.97
5	Display Aboriginal and/or Torres Strait Islander artwork and / or flags	42	3.36	.98
6	Provide antenatal records through to discharge summaries to all relevant stakeholders	42	3.36	.85
7	Encourage family members to accompany and support Aboriginal and / or Torres Strait Islander women	42	3.6	.63
8	Involve Aboriginal and / or Torres Strait Islander women in design and implementation of health promotion activities and programs	42	2.02	1.1
9	Collect data on which services Aboriginal and /or Torres Strait Islander women use within your maternity services	42	2.38	1.2
10	Report on evaluation of maternity outcomes for Aboriginal and /or Torres Strait Islander women as a specific cohort	42	2.45	1.2
11	Rating of cultural competence of maternity service	42	2.43	.70
12	Rating of format of survey	43	2.28	.59
13	Clarity of questions in survey	43	2.33	.61
14	Consistency of questions in survey	43	2.23	.53
15	Benefit of questions in survey	44	2.07	.66

Factor analysis can only work if there are some relationships between variables and the Bartlett method was used to assess this (Field 2013). A significant Bartlett test ( $p < 0.05$ ) demonstrates that factor analysis is therefore appropriate (Field 2013), and this was demonstrated by the two subscales in the survey, respectively, 190.16, 59.97,  $p < 0.001$ . The Bartlett test also assesses sampling adequacy (Field, 2013), and demonstrated further evidence of sufficient sampling for this study. Communalities were assessed for the first subscale with all communalities being above 0.6, for this small sample (less than 100) and measured as adequate for sample size (see table 4).

Measures of sampling adequacy (MSA's) were evaluated for the second subscale, with values being greater than 0.7, indicating adequacy and suitability for retaining items in the analysis (see table 5). Using the Kaiser-Meyer-Olkin method of assessment, the sample was deemed adequate for sample size, both subscales measuring 0.79 and 0.75 overall respectively (Field 2013).



**Table 4: Communalities for Cultural Competency subscale**

No	Question	Extraction
1	Recruitment of Aboriginal and / or Torres Strait Islander employees	.754
2	Specification of cultural competence in policies as selection criteria for employee recruitment	.752
3	Guidelines and policies specific to Aboriginal and / or Torres Strait Islander maternity care and / or support culturally competent care	.728
4	Providing educational resources	.714
5	Display Aboriginal and/or Torres Strait Islander artwork and / or flags	.775
6	Provide antenatal records through to discharge summaries to all relevant stakeholders	.828
7	Encourage family members to accompany and support Aboriginal and / or Torres Strait Islander women	.803
8	Involve Aboriginal and / or Torres Strait Islander women in design and implementation of health promotion activities and programs	.660
9	Collect data on which services Aboriginal and /or Torres Strait Islander women use within your maternity services	.780
10	Report on evaluation of maternity outcomes for Aboriginal and /or Torres Strait Islander women as a specific cohort	.803
11	Rating of cultural competence of maternity service	.843

**Table 5: Measure of sampling adequacy factor loadings for assessment of survey subscale**

No	Question	MSA
12	Rating of format of survey	.736
13	Clarity of questions in survey	.718
14	Consistency of questions in survey	.768
15	Benefit of questions in survey	.794

A Likert scale assessed the level of progress made in working towards achieving cultural competence and assessment of the tool was provided as four options with rating the clarity, benefit, consistency and format. The majority of respondents answered that they believed the survey was good in all of these areas, with remaining respondents answering adequate and extremely good. Of significance, approximately 80% of respondents ranked the benefit of the survey as good or extremely good. Minimal respondents ranked the survey as less than adequate. These results highlight that organisations value the need for future work in this area. Almost two-thirds (61.4%) of respondents completed the survey between 15 to 30 minutes, almost a quarter (22.7%) in less than 15 minutes and a small proportion (15.9%) took longer than 30 minutes to complete.

Principal component analysis to extract factors was used in the first instance (table 6). The majority of the questions loaded onto the first factor that promoted cultural competence. The second factor identified two questions related to actively acknowledging women's Aboriginal and Torres Strait Islander heritage / identity. The third factor specifically identified questions relating to supporting Aboriginal and Torres Strait Islander women during their childbearing journey. The fourth factor identified two questions that related to reporting and collecting data on Aboriginal women's outcomes, with one question on recruitment.



**Table 6: Factor loadings for subscales for Principle Component Analysis for all questions**

<b>Cultural competence Questions</b>	<b>Factor 1 Promotion of cultural competence</b>	<b>Factor 2 Actively acknowledging heritage / identity</b>	<b>Factor 3 Supporting women</b>	<b>Factor 4 Development and reporting about Aboriginal women</b>
1	.502			.630
2	.694	-.491		
3	.794			
4	.794			
5	.424	.691		
6			.812	
7			.815	
8	.729			
9	.677			-.563
10	.613	.446		-.477
11	.874			
<b>Assessment Questions</b>	<b>Factor 1</b>			
12	.818			
13	.846			
14	.805			
15	.770			

Orthogonal varimax with Kaiser rotation was used to improve interpretability of the factors and further refined the groupings of questions (table 7). The first factor only identified six questions related to cultural competence as compared with the previous table that identified nine questions. The second subscale identified only one question from the previous table with two new questions specifically acknowledging women's identity as Aboriginal and / or Torres Strait Islander people, as opposed to the other two questions which were broader and related to reporting and selection criteria. Therefore, rotation has further refined this factor and the relevance of the questions. The third factor identified the same factor, only the loadings were higher in this rotation. The fourth factor identified two of the same questions from the previous table related to development and reporting, and one new question, relating to liaising with Aboriginal and / or Torres Strait islander stakeholders about the effectiveness of services. The factor loadings were also higher than those in the previous table, confirming greater suitability of this factor. As the second subscale revealed only one factor, this could not be rotated.

Eigenvalues exceeding a value of one identify those factors that are most substantially important (Field 2013). The first subscale revealed a factor solution of four factors with eigenvalues of over one. The first factor explains 40.6% of variance, the second, 14.3% of variance, the third, 11.5% and the fourth, 10.3% (76.7% total variance). The second subscale identified only one factor with an eigenvalue over one and for this reason, could not be rotated. This factor explains 65.6% of the variance. Eigenvalues are displayed in table 8.

**Table 7: Factor loadings for subscale Cultural Competence for Orthogonal Varimax with Kaiser Rotation**

Cultural competence Questions	Factor 1 Promotion of cultural competence	Factor 2 Actively targeting Aboriginal and Torres Strait Islander people	Factor 3 Supporting women	Factor 4 Development and reporting cultural competence
1		.742		
2	.854			
3	.767			
4	.758			
5		.741		.416
6			.899	
7			.858	
8	.447	.562		
9	.427			.753
10				.846
11	.856			

**Table 8: Eigenvalues for both subscales**

Cultural competence subscale	Factor 1 Promotion of cultural competence	Factor 2 Displaying artwork or flags	Factor 3 Supporting women	Factor 4 Development and reporting cultural competence
	4.47	1.57	1.26	1.13
Assessment subscale				
Factor 1	2.62			

Internal consistency for the scales was evaluated by Cronbach's alpha reliability with a coefficient alpha of 0.70 being acceptable for a new survey (DeVon et al 2007). A Cronbach's alpha reliability of 0.835 was achieved for the cultural competence subscale and 0.750 for the assessment subscale, establishing evidence of a reliable survey. These results demonstrate construct validity and reliability and the capability of the tool being used for cyclical use, not only in maternity care organisations but for other health professions' assessment of cultural competence in the work place.

## DISCUSSION

The statistical analysis of the responses from respondents confirms validity and reliability. The results strongly suggest that with some minor revision to the tool, the research aim of developing an instrument suitable for cyclic use has been achieved. These findings concur with other researchers (Mbuagbaw et al 2014) who also used content validity, construct validity and test-retest reliability in development of their tool, and who suggest that further distribution to different populations in different settings could provide further validation. In this case, both distribution to different populations and further refinement within the existing populations surveyed is recommended in order to achieve the research aim of evaluating organisational cultural competence to improve the experiences of Aboriginal women. This could be achieved through using the tool as a component of mandatory reporting requirements in all public maternity services. Such use would both provide the opportunity for greater refinement and obtain a more accurate assessment of progress towards adopting organisational characteristics of cultural competence than was achieved with only a small number of services participating in this research.

There is also current momentum for such work more broadly than within maternity services. West et al (2017) have validated a survey to measure midwifery student's capability against the Aboriginal and Torres Strait Islander Health Curriculum Framework (Department of Health 2014). Culturally safe and respectful practice is included in the updated Nursing and Midwifery Board of Australia Code of Conduct for Nurses and Midwives (NMBA 2018). The Australian Council of Safety and Quality Standards in Health Care (ACSQHC 2017) have included six specific actions in their requirements for health services to meet the needs of Aboriginal and Torres Strait Islander people. Together these initiatives support expanding the application of this current research to the broader health care population to develop appropriate tools for a cycle of evidence informed initiatives and evaluation in health services nationally. Adapting the validated questions from this tool for incorporation in patient experience questionnaires would also contribute to this endeavour.

## LIMITATIONS

The small sample size may have contributed to the reliability of the survey, and repeating the research to include a larger number and wider range of maternity services will assist in further refining the tool, and greater generalizability of findings.

Another limitation is that employees were not asked to identify their Indigenous status. Therefore, the results may not reflect the views of Aboriginal and/or Torres Strait Islander staff. Moreover, research by McBain-Rigg and Veitch (2011) identifies that the perceptions of non-Indigenous staff and Indigenous patients differed in what they considered culturally sensitive care. Accordingly, as suggested above, considering how this survey may be developed to also gain the perspective of Aboriginal and Torres Strait Islander women is indicated.

Such development and any further refinement of the tool would benefit from a more decolonizing approach than was used to develop the current survey. Although Aboriginal and Torres Strait Islander people participated in the reference group the limited Indigenous knowledge and governance this offered could be improved upon by incorporating local governance by First Nations people in the future to refine the national tool for local level application. Work by West et al (2017) provides one such model.

## CONCLUSION

This research has presented a snapshot of how organisations are working to improve access to culturally competent maternity care in public maternity services, and that with further development, following distribution over some years and inclusion of community governance and community validation measures, the tool used for this research will provide a mechanism for ongoing evaluation of progress. This research also suggests that with further work, the tool may be suitable for adaptation for use beyond maternity services and across a wider range of health service areas.

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