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Testing a health research instrument to develop a statewide survey on maternity care

Running title

Using a survey from research in practice

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ABSTRACT (56 words)

Partnerships between researchers and end users are an important strategy for research uptake in policy and practice. This paper describes how collaboration between an academic research organisation (the Kolling Institute) and a government performance reporting agency (the NSW Bureau of Health Information (BHI)), contributed to the development of a new statewide maternity care survey for NSW.

Key points (69 words)

- Researchers at the Kolling Institute surveyed new mothers in NSW public hospitals about their experiences of maternity care.
- BHI testing of the Kolling survey demonstrated that it performed well on important survey performance measures. This analysis informed BHI's development of a statewide maternity survey.
- Collaboration provided expertise that informed and enhanced the development of the original survey as well as the new statewide survey, implemented across NSW in 2015.

INTRODUCTION (1896 words)

The primary policy governing maternity care in NSW is entitled Towards Normal Birth (TNB).(1) Central to the TNB policy is the promotion of 'woman-centred care', that is care which recognises and responds to a woman's social, emotional, physical, psychological, spiritual and cultural needs. Feedback from women about existing maternity services can help to identify whether services are currently meeting women's needs. Research conducted overseas and in some parts of Australia has explored women's satisfaction with maternity care services, predominantly through dedicated surveys of women who have recently given birth.(2-9)

In NSW, the Bureau for Health Information (BHI) is the statutory agency responsible for reporting on the performance of the public health system, including monitoring patient experiences of hospital care. Maternity patients have previously been included in general overnight patient surveys in NSW, however these surveys have included only a small number of maternity-specific questions.(10)

In 2012, researchers at the Kolling Institute initiated discussions with the NSW Ministry of Health, which had policy responsibilities for maternity services, and the BHI about conducting a dedicated maternity survey. The researchers wanted to conduct policy-relevant research and were interested in better understanding women's expectations of, and experiences, with maternity care. The TNB policy was scheduled for review in 2015, so feedback to policy-makers from women about public maternity care services was considered important. The BHI's expertise and experience in conducting patient surveys meant it could contribute valuable advice and assistance to the project. Coincidentally, the BHI's forward plan included the

development of a new statewide maternity survey, so the research survey (the 'Kolling survey') provided a timely opportunity to test a range of survey items and survey methods with a NSW maternity sample.

At the end of the survey data collection period, the BHI approached the Kolling researchers, seeking information about the maternity survey and lessons learnt. The BHI also requested access to de-identified data to assess the performance of the survey tool. This paper briefly describes the survey project, and the analyses that were undertaken to assess specific measurement properties of the survey. We then describe how the findings were used to inform the design of the statewide maternity survey, introduced in NSW in 2015.

METHOD

Survey development

The Kolling survey included questions drawn from previous maternity surveys (3, 6, 8) and consultations with stakeholders including the BHI and the NSW Ministry of Health. It comprised 123 questions structured around the three main maternity periods – antenatal, birth and postnatal. The survey also sought consent from each woman to link survey responses with health information recorded in each maternity unit's clinical database (ObstetriX). Further details are available elsewhere.⁽¹¹⁾ The study was approved by the NSW Population & Health Services Research Ethics Committee.

Survey sample

A sample of 2048 women, who represented all women giving birth at seven public maternity units in two local health districts in NSW between March and May 2013, was invited to participate in the survey. Letters were returned as undeliverable for 59 women (3%), leaving a sample of 1989, of whom 913 returned a completed survey.

Analysis of the survey tool's measurement properties

The following measurement properties were examined:

- Response rates and evidence of response bias
- Quality of individual survey items, based on three measures:
 - response dispersion (in particular, ceiling or floor effects, that is, whether responses to an item were concentrated at one end of the response range – either overly positive (ceiling) or overly negative (floor))
 - data completeness – items with high levels of missing data (>4%) could indicate that questions and/or response options were not clear, not relevant, or difficult to answer
 - highly correlated items ($r > 0.7$) – could indicate duplication (i.e., measuring the same construct), or survey design issues (for example, consecutive items not being treated as independent, resulting in coalescing of responses).
- Data accuracy – assessed by comparing three data items (maternal age, mode of birth, neonatal outcome) that were replicated in the survey and available in the maternity units' clinical database (ObstetriX). This comparison provided an indicator of external validity and how well women were responding to the survey questions.

All analyses were performed using SPSS Version 22. Categorical survey items about the delivery of maternity care ('performance-related items') were recoded into a directional scale where optimal performance was represented as 100 and worst possible performance was represented as zero. Mean scores were calculated for the entire population response, and for that item in each maternity unit. Means were used to assess the ability of the survey items to effectively discriminate between the performances of the maternity units in the sample. Comparisons between means were undertaken using independent samples t-tests. Ceiling and floor effects were identified using three criteria: skewness >1.5, mean >85, and standard deviation <25. Inter-item correlations were calculated using Pearson's Product-Moment correlations, and correlations of items across the survey through principle components factor analysis, with a value of $r > 0.7$ set as a 'high correlation'. A p-value of 0.05 was considered statistically significant.

RESULTS

Response rates and response bias

The Kolling survey response rate was 46% (913/1989). Response rates varied by maternity unit, ranging from 34% to 59%. Non-responders were significantly younger than responders ($X = 30.3$ years, $SD = 5.7$, vs. 31.9 years, $SD = 5.0$, $t(1988.01) = -6.53$, $p < 0.001$). Among women completing the survey, 97% ($n=882$) gave consent to link survey data with clinical data recorded by the maternity units.

Quality of survey items

Response dispersion: Evidence of ceiling effects but not floor effects was found among some items (Table 1). Women gave high ratings to a set of questions grouped together in a grid about different aspects of their antenatal care (organisation of appointments, information and explanations provided, time to ask questions, treated with kindness and understanding, and involvement in decision making): mean scores = 87.4 - 95.6. Similar items were repeated in the birth and postnatal sections of the survey, and similar patterns of responses were found (birth mean scores 89.3 - 94.0; postnatal mean scores 84.4 - 89.7). Two other questions showed high levels of positive responses across all maternity units (*skin to skin contact with baby* and *contacted or visited at home by a midwife*).

Data completeness: Rates of missing responses for all items in the survey were $\leq 1\%$.

Highly correlated items: Two items about infant feeding (*given active support and encouragement* and *given practical help*) were highly correlated ($r = 0.74$, $p < 0.001$).

Data accuracy

Comparison of three data items (*maternal age, mode of birth, neonatal outcome*) that were collected in the survey and in the ObstetriX database demonstrated high concordance. All but one survey respondent had a self-reported age up to 2 years different from the maternal age recorded in ObstetriX (a lag of two years was allowed between birth and the completion and return of the survey). For mode of birth, one woman reported having a caesarean section in the survey that was recorded as an instrumental vaginal birth in ObstetriX. There were also 20 cases (2%) where survey

respondents reported having a vaginal birth, which was recorded as an assisted vaginal birth in ObstetriX. There was 100% concurrence between survey responses and ObstetriX data for *neonatal outcome* (live birth, stillbirth, neonatal death).

DISCUSSION

The analyses conducted by the BHI demonstrated that the Kolling research survey tested well against several survey performance measures, with good response rates, minimal missing data, limited highly correlated items and accurate data capture.

These results are all indicators of good measurement quality in a survey,(12, 13) and have affirmed the use of the Kolling survey as a key resource in the BHI's development of the statewide NSW maternity survey.

The Kolling survey sought consent from women to link their survey data with existing routinely collected data. This has not been done in previous maternity surveys, although it has been used in other health-related research.(14-16) The vast majority of women who returned a completed survey gave consent to record linkage (97%). While we cannot assess whether the consent for linkage question dissuaded some women from responding to the Kolling survey, the level of consent is higher than typical for BHI patient surveys, which range from 79% (emergency department surveys) to 86% (paediatric surveys).

The development of the Kolling survey rested largely on two fundamental approaches: that it was evidence-based, drawing on items used in previous maternity surveys; and that it was developed collaboratively with key stakeholders who provided opinions about survey items, advice on appropriate terminology and

language, and methodological suggestions such as how best to present information to women about the request for consent for data linkage. The BHI was especially helpful in providing literature and advice about successful strategies for increasing survey response rates.

Collaboration with the BHI allowed testing of several measurement properties of the survey tool. This is an important process in survey development that is often done but less often publically reported. The positive results for the Kolling survey have complemented the BHI's usual rigorous survey design processes with the timely availability of a survey tool tested among a sample of NSW women. This is a very real and practical example of research being used to inform practice. The BHI and Kolling researchers have continued to collaborate on the new maternity survey, through joint membership of the NSW Maternity Care Survey Advisory Committee, sharing some of the knowledge gained from the research survey that might inform the statewide survey process.

The NSW Maternity Care Survey, implemented by the BHI in 2015, includes 96 items of which nearly half are either the same as, or similar to items in the Kolling survey. Some items in the statewide survey that were not in the Kolling survey were included because of findings from the Kolling study, for example, complementing an item about breast feeding initiation with another about duration. The two highly correlated infant feeding items that were identified in the Kolling survey were not included in the statewide survey but replaced by others because the Kolling survey showed that infant feeding was an important issue for women. Some of the performance-related items in the Kolling survey that showed high ceiling effects were

also discarded. In addition, the statewide survey included various 'standard' items that the BHI uses in all of its patient experience surveys. Finally, based on the response patterns and correlations observed for questions presented in a grid structure, the NSW Maternity Care Survey presents all questions individually (see http://www.bhi.nsw.gov.au/nsw_patient_survey_program/maternity_care_survey).

Regular interaction and effective partnership between research producers and research users are promoted as important facilitators for research uptake in policy and practice,(17-19) and for building more extensive and ongoing collaborations.(20) Our experience suggests building such relationships are essential to the production of research that is relevant and useful. At the same time, our experience has also shown the importance of serendipity and the fortuitous connections between individuals that can bring agencies together.

CONCLUSION

The development and testing of a maternity experience survey, initially developed for a research study, played a significant role in informing the development of the NSW Maternity Care Survey led by the BHI. The latter survey, introduced in 2015, provides 14,000 new mothers across NSW with the opportunity to reflect on the maternity care they received, and to identify areas of strength and opportunities for improvement. Health policy-makers and service providers will, for the first time, have access to robust hospital-level information about maternity care in NSW and how well services are meeting women's needs.

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AUTHOR CONTRIBUTIONS

AT and MP were responsible for the design and conduct of the research survey. CA and JB designed and undertook analysis of the survey tool. The manuscript was drafted by AT and CA, and reviewed by JB and MP. AT and JB drafted the revisions, which were reviewed by CA and MP.

REFERENCES

1. NSW Department of Health. Towards Normal Birth in NSW, 2010.
http://www.health.nsw.gov.au/policies/pd/2010/PD2010_045.html
2. Public Health Agency of Canada. What Women Say: the Maternity Experiences Survey of the Canadian Perinatal Surveillance System. Available from:
<http://www.phac-aspc.gc.ca/rhs-ssg/survey-enquete/mes-eem-eng.php>.
3. Redshaw M, Heikkila K. Delivered With Care: a National Survey of Women's Experiences of Maternity Care, 2010. Available from:
<https://www.npeu.ox.ac.uk/files/downloads/reports/Maternity-Survey-Report-2010.pdf>.
4. Declercq E, Sakala C, Corry MP, Applebaum S, Herrlich A. Listening to Mothers SM III: Pregnancy and Birth, 2013. Available from:
http://transform.childbirthconnection.org/wp-content/uploads/2013/06/LTM-III_Pregnancy-and-Birth.pdf.
5. Care Quality Commission. National Findings from the 2013 Survey of Women's Experiences of Maternity Care, 2013. Available from:
http://www.cqc.org.uk/sites/default/files/documents/maternity_report_for_publication.pdf.
6. Miller YD, Thompson R, Porter J, Prosser SJ. Findings from the Having a Baby in Queensland Survey 2010, 2011. Available from:
<http://www.qcmb.org.au/media/pdf/Survey%20Report%202010.pdf>.
7. Prosser SJ, Miller YD, Armanasco A, Hennegan J, Porter J, Thompson R. Findings from the Having a Baby in Queensland Survey, 2012. Brisbane: Queensland Centre for Mothers & Babies, The University of Queensland, 2013.

8. Brown S, Darcy M-A, Bruinsma F. Having a baby in Victoria 1989–2000: continuity and change in the decade following the Victorian Ministerial Review of Birthing Services. *Australian and New Zealand Journal of Public Health*. 2002;26(3):242-50.
9. Brown S, Lumley J. Changing childbirth: lessons from an Australian survey of 1336 women. *BJOG: An International Journal of Obstetrics & Gynaecology*. 1998;105(2):143-55.
10. Ford JB, Hindmarsh D, Browne K, Todd AL. Are women birthing in NSW hospitals satisfied with their care? *BMC Research Notes*. 2015;8:106, DOI 10.1186/s13104-015-1067-2.
11. Todd AL, Porter M, Williamson J, Patterson JA, Roberts CL. Pre-notification letter type and response rate to a postal survey among women who have recently given birth. *BMC Medical Research Methodology* (*under review*).
12. Alwin DF. Research on survey quality. *Sociological Methods & Research*. 1991;20(1):3-29.
13. Watson N, Wooden M. Assessing the Quality of the HILDA Survey Wave 1 Data. HILDA Project Technical Paper Series No. 4/02, October 2002. Melbourne: Melbourne Institute of Applied Economic and Social Research.
14. Tate AR, Calderwood L, Dezateux C, Joshi H, The Millennium Cohort Study Child Health Group. Mother's consent to linkage of survey data with her child's birth records in a multi-ethnic national cohort study. *International Journal of Epidemiology*. 2006;35(2):294-8.
15. Mindell J, Biddulph JP, Hirani V, Stamatakis E, Craig R, Nunn S, et al. Cohort profile: The Health Survey for England. *International Journal of Epidemiology*. 2012;41(6):1585-93.

16. Gray L, Batty GD, Craig P, Stewart C, Whyte B, Finlayson A, et al. Cohort profile: The Scottish Health Surveys Cohort: linkage of study participants to routinely collected records for mortality, hospital discharge, cancer and offspring birth characteristics in three nationwide studies. *International Journal of Epidemiology*. 2010;39(2):345-50.
17. Lomas J, Fulop N, Gagnon D, Allen P. On being a good listener: setting priorities for applied health services research. *Milbank Quarterly*. 2003;81(3):363–88.
18. Haynes AS, Derrick GE, Chapman S, Redman S, Hall WD, Gillespie J, et al. From "our world" to the "real world": exploring the views and behaviour of the policy-influential Australian public health researchers. *Social Science and Medicine*. 2011;72:1047-55.
19. Moore G, Redman S, Haines M, Todd A. What works to increase the use of research in population health policy and programmes: a review. *Evidence & Policy*. 2011;7(3):277-305.
20. Ross S, Lavis J, Rodriguez C, Woodside J, Denis JL. Partnership experiences: involving decision-makers in the research process. *Journal of Health Services Research and Policy*. 2003;8 (Suppl 2):26-34.

Table 1: Maternity survey items with limited response dispersion

Survey Item	Lowest Hospital Mean	Highest Hospital Mean	Mean Score	Standard Error
<i>Antenatal</i>				
I was treated with kindness and understanding	93.2	100.0	95.6	0.5
Information was explained to me in a way I could understand	91.9	100.0	95.2	0.5
I was given enough time to ask questions or discuss my pregnancy	90.5	100.0	94.5	0.6
I felt comfortable asking questions	90.4	100.0	94.2	0.6
I felt involved in decisions about my care	89.9	100.0	92.6	0.7
I was given the information or explanations I needed	86.5	100.0	92.0	0.7
My antenatal appointments were well organised	84.1	100.0	87.4	0.8
My carer(s) gave me consistent information	83.3	100.0	87.9	0.8
<i>Birth</i>				
Did you have skin to skin contact with your baby shortly after the birth?	91.9	100.0	96.3	0.7

I was treated with kindness and understanding	89.4	100.0	94.0	0.6
Information was explained to me in a way I could understand	89.3	100.0	93.4	0.6
I felt comfortable asking questions	87.1	96.9	92.4	0.7
I felt involved in decisions about my care	84.5	100.0	89.3	0.8
I was given the information or explanations I needed	83.1	100.0	89.6	0.8

Postnatal

Were you contacted or visited at home by a midwife?	95.3	100.0	98.0	0.4
I was treated with kindness and understanding	87.6	100.0	89.7	0.7
Information was explained to me in a way I could understand	87.3	100.0	89.5	0.8
I felt comfortable asking questions	83.8	100.0	86.7	0.8
I felt involved in decisions about my care	83.6	100.0	87.1	0.9
I was given the information or explanations I needed	82.4	96.9	84.4	0.9
I was given consistent information	74.6	100.0	77.8	1.1