A Comparison of Intensive vs. Light-Touch Quality Improvement Interventions for Maternal Health in Uttar Pradesh, India

Dominic Montagu (dominic.montagu@ucsf.edu)
UCSF https://orcid.org/0000-0002-2477-5543
Katie Giessler
UCSF
Michelle Kao Nakphone
UCLA
Cathy Green
Consultant
Kali Prosad Roy
Population Services International India
Ananta Basudev Sahu
Population Services International India
Kovid Sharma
Population Services International India
May Sudhinaraset
University of California Los Angeles

Research

Keywords: Quality Improvement, Person-Centered Care, Maternal Health

Posted Date: May 28th, 2020

DOI: https://doi.org/10.21203/rs.3.rs-29983/v1

Version of Record: A version of this preprint was published at BMC Health Services Research on December 1st, 2020. See the published version at https://doi.org/10.1186/s12913-020-05960-6.

Abstract

Background

Poor patient experiences during delivery leads to delayed presentation at facilities and contributes to poor maternal health outcomes. Person-centered maternity care (PCMC) is a key component of quality. Improving PCMC requires changing the process of care which can be complex and require significant external input, making replication and scale difficult. This study compared the effectiveness two Quality Improvement (QI) intervention phases, one Intensive, one Light-Touch.

Methods

We used a matched case-control design to compare two phases of a QI Intervention targeting PCMC, with three facilities in each. The Intensive phase was introduced into three government facilities where teams were supported to identify, design, and test potential improvements over 12 months. The Light-Touch phase was subsequently introduced in three other government facilities and changes were tracked over six months. We compared the two groups using multivariate linear regression and difference-in-difference models to assess changes in PCMC outcome.

Results

Both Intensive and Light-Touch arms demonstrated large improvements in PCMC. On a scale from 0 to 100, Intensive facilities increased in PCMC scores from 85.02 to 97.13, while Light-Touch facilities increased from 63.42 to 87.47. For both there was a 'halo' effect, with a similar improvement recorded for the specific improvement activities focused on, as w ell as aspects of PCMC not directly addressed.

Conclusions

This study demonstrated that a short, inexpensive, light-touch and directive intervention can change staff practices and significantly improve the experiences of women during childbirth. It also shows that improvements in a few areas of provider-patient interaction have a 'halo' effect, changing many other aspects of patient-provider interaction at the same time.

Trial Registration

QI Phase 1 - NCT04208867. Retrospectively registered. December 19th, 2019. link to the registration:https://clinicaltrials.gov/ct2/show/NCT04208867?term=NCT04208867&draw=2&rank=1

QI Phase 2 – NCT04208841. Retrospectively registered. December 23, 2019. link to the registration:https://clinicaltrials.gov/ct2/show/NCT04208841?term=NCT04208841&draw=2&rank=1

CONTRIBUTIONS TO THE LITERATURE 98 words

· Medical practioners' treatment of patients are influenced by institutional norms and difficult to change.

· Team-based initiatives which actively engage staff have been effective in wealthy countries but are not common in middle-income settings, and have not been applied to person-centered aspects of care.

· We found that team-based quality improvement efforts were effective in India at changing patient experience. Once change-practices were identified, these practices were introduced to new facilities with low-intesity support and proved equally effective at improving care.

· These findings add to the limited evidence on team-based quality improvement, and provide evidence of effective scaleable implementation opportunities.

Background

Maternal mortality rates (MMR) in India remain high. Specifically, Uttar Pradesh's MMR is one of the highest in India, reporting 201 deaths per 100,000 live births in 2014-16 (1). One factor contributing to this high MMR is poor quality care within clinics and hospitals (2). Poor quality care often deters women from accessing healthcare for both urgent current needs and for follow-on health needs, regardless of necessity; this is true for both poor clinical quality and poor person-centered quality (3–5). Interventions that improve facility-based care quality are therefore likely to improve utilization of reproductive and intrapartum healthcare and reduce avoidable morbidity and mortality (6). The importance of person-centered maternity care (PCMC) and client experience is a central component of the quality needing improvement (7).

Benefits of Person-Centered Maternity Care

PCMC includes multiple dimensions of care that patients experience in a facility and the environment in which a woman seeks care, including interpersonal interactions, freedom from coercion and abuse, informed and consented care, and provision of respectful care (5,8). Higher levels of

PCMC is associated with higher patient satisfaction, earlier presentation for care, improved adherence to post-care treatment, and lower health care costs overall (9,10).

The quality of person-centered maternity care in Uttar Pradesh is low in many settings, especially in public health facilities where 45% of women deliver (11,12). Poor person-centered care can delay the recognition of complications, the decision to treat or refer, and limit the amount of information that is shared with a receiving facility, thereby making referrals more difficult and generating higher risk of complication for the woman being referred (13). Poor person-centered care during delivery in Uttar Pradesh has been predicted to have lasting effects on mothers' decisions about post-partum check-ups, well-baby care, and health seeking for future births (4,14).

Challenge

Recent large-scale studies in Uttar Pradesh have shown both the potential to change some common practices among both clinical and non-clinical staff, and the high cost and long-term investments needed to effect those changes (15,16). The Quality Improvement (QI) literature has documented both the sustained effect, and the gradual change and simplification of interventions over time in hospital settings(Robert *et al.*, 2020). Team-based QI interventions demand significant time and resources commitments and so there has been experimentation in many settings with "Light Touch" variations(17–20). We conducted a study to see if less-demanding interventions could create similar results in improving person-centered care.

Methods

In collaboration with the National Health Mission (NHM) of Uttar Pradesh, we conducted a matched case-control quality improvement (QI) intervention to improve the PCMC provided to women delivering in government facilities. Study sites were identified through previous participation in a large-scale, clinical quality improvement research intervention, and selected based on delivery volume and being either a Primary Health Center (PHC) or a Community Health Center (CHC). Nine facilities in Unnao and Kanpur Nagar districts met our criteria: three PHCs and six CHCs. Three facilities (two CHCs and one PHC) were randomly selected for the Intensive phase and three additional facilities matched as controls based on facility-reported delivery volume. After the 12 months intensive phase, three of the control sites received the Light Touch spread package during the second phase of the study.

The facilities were all rural in location and in districts selected to be broadly reflective of the average socio-economic distribution of Uttar Pradesh state.

Intervention Phases

Phase 1: Intensive sites. The three Intensive intervention sites applied IHI's Improvement Collaborative model to address PCMC indicators which had been established as priorities through formative studies, and which were determined to be relevant to the facilities based on baseline evaluation performance(21,22). In the first phase, the intervention brought representative teams from each facility together every three months to identify potential changes they could introduce to improve. These were subsequently tested by individual teams using feedback from patients to inform their perceived efficacy. The team activities were supported by an external advisor who met with each team weekly. The set of process changes which were determined to be effective based on data from exit interviews were collated as a 'Change Package' covering eight aspects of PCMC (see below).

Phase 2: Light Touch sites. In the second, spread phase, we worked with the facilities that acted as controls during the initial Intensive phase, and encouraged staff to select and introduce relevant process changes from the Change Package developed by teams from the Intensive sites. This Light Touch phase required less external input exhanced by governmental approval and the agreement and support of facility leadership. At the start of the second phase, representatives from the Light Touch facilities were introduced to the teams who developed the Change Package and heard first-hand of their successes. These staff were then visited for approximately 1.5-2 hours every two weeks by the external advisor who had supported the Intensive teams. He provided encouragement for their work, created momentum and responded to any questions. The frequency of these external visits decreased to one per month by the end of the six-month study. Further descriptions of the intervention in the Light Touch sites are available elsewhere (23).

Data Collection

The baseline Intensive site survey was conducted in all facilities between September 2016 and March 2017. The endline for the Intensive sites was conducted in two waves between May and December 2018. In total, 285 women were surveyed at baseline and 300 at endline from three Intensive intervention facilities. At the Light Touch sites, baseline surveys were conducted between April and June 2018 (n=300). Endline surveys were conducted between April and June of 2019 (n=300). For both Intensive and Light Touch phases, inclusion criteria were women aged 18-49 years who had delivered at the health facility in the last seven days and who were willing and consented to participate. Women who had delivered outside of a participating health facility, were not well enough to participate at the time of recruitment, were less than 18, or who refused to participate following a short explanation about the study purpose were excluded from participating in the survey.

Surveys were conducted using a pre-tested, structured questionnaire. Local investigators were recruited and trained to conduct informed consent and administer the survey via a web-based application. Quality checks (skip patterns, relevance and constraints) were developed in the application and

surveys reviewed by the local Research Manager to ensure quality and accuracy. Women who agreed to participate in the study provided verbal consent and each survey took approximately 45 minutes. All surveys were conducted in person at the health facility by female enumerators, using a tablet-based guide, in the most private setting available.

Ethics Compliance

Human subjects approval for this study was received in both the United States, from the University of California, San Francisco (IRB# 15-18008, ref 176940; 11/09/2016), and in India, from the Public Health Foundation of India (TRC-IEC-276/15; May 2, 2016).

Outcome Variables

Person-Centered maternity care Indicator

Person-centered maternity care was assessed using the PCMC scale that measures care received within three domains: dignity and respect; communication and autonomy; and supportive care. This scale was validated using survey data specifically from women who had delivered in Uttar Pradesh and contains 27 items to measure a woman's PCMC experience at the facility (24). Four items could not be matched between baseline and endline. Each item asked about frequency of person-centered experiences or care received and scores on individual items ranged from 0 to 3 (0 "No never"; 1 "Yes, a few times"; 2 "Yes, most of the time"; 3 "Yes, all of the time"). Responses that were recorded as "not applicable" were conservatively recoded to receive the highest score. Total PCMC scores were calculated by summing all items for each participant, ranging from zero to 69 points. Final total PCMC and subdomain scores were scaled to 100-point scales.

Change Package indicators

We investigated eight targeted PCMC indicators that were the focus of the Change Package, hereby referred to as "Change Package PCMC score". These eight indicators include the following: 1.) Provider introduction; 2.) Assurance of visual privacy during exams; 3.) Ability to labour and deliver in the woman's position of choice; 4.) Cleanliness of toilets/washrooms 5.) Provision of pain medication; 6.) Explanation of medicines and procedures; 7.) Cleanliness of the postnatal ward; and 8.) Assisting the recently delivered woman to the toilet. The latter 3 items were not represented in the PCMC scale, but responded to change ideas prioritized by the facilities and their patients. Total scores for each participant summed all items and could range from zero to 24 points. To assist with interpretability, the eight specific PCMC indicators were also scaled to 100-point scales.

Non-Change Package ("halo") Indicators

To examine the impact of the Light Touch intervention on other indicators not targeted by the change package, we constructed a 'Non-Change Package PCMC score' comprising all items in the PCMC scale except the first four items which were included in the Change Package as noted abov and described in Table 2. Assessing changes in these indicators were intended to measure a 'halo effect', of differences in behaviors indirectly caused by to work on targeted indicators. Total scores could range from zero to 57 points and were also scaled to a 100-point scale.

Other associated variables

We examined factors that may be associated with PCMC and other outcomes including socioeconomic factors, pregnancy characteristics, and provider characteristics. We investigated the distributions of age, parity, wealth, religion, caste, literacy, education, number of antenatal care (ANC) visits, pregnancy complications, facility type, as well as type and gender of delivery assistant. Wealth was assessed by a modified EquityTool based on India NFHS4 [Released March 30, 2019], equitytool.org, maintained by Metrics for Management.

Analysis

We conducted three sets of analyses to assess the impact of the Light Touch phase compared to the Intensive phase on 1) total PCMC scores, 2) Change Package PCMC scores that were worked on by facilities and 'Halo Effect' indicators, and 3) sub-domains of the total PCMC. Differences between treatment groups at each phase were assessed by cross-tabulations, chi-square tests, and t-tests. We constructed multivariate linear regression difference-in-differences models for each set of analyses to evaluate the impact of the intervention on various outcomes including main effects terms for survey round and treatment group and an interaction term to indicate the difference between groups across time. We tested for homogeneity of variance and used robust standard errors (Eicker-Huber-White) to correct for homoschedasticity and clustering. Final multivariate models adjusted for age, parity, education, wealth, religion, caste, facility type, delivery provider, number of ANC visits, and pregnancy complications. Stata SE 15.1 was used for all analyses and statistical significance was established at an alpha level of 0.05.

Results

Demographic characteristics

At baseline, participants at Light Touch sites had greater wealth and higher education than those at Intensive phase facilities (Table 1). Intensive facilities' participants attended fewer ANC visits than Light Touch participants at baseline, but more at endline. More participants at Intensive

facilities had pregnancy complications than those at Light Touch facilities at baseline, but no significant difference was observed at endline. Across time, deliveries assisted by ANMs, Anganwadi workers and ASHAs (community health workers) increased in Light Touch facilities, whereas nurse, physician and Midwife/Dai assisted deliveries increased at Intensive facilities between survey rounds.

Table 1
Characteristics of participants, by Light Touch/Intensive groups and survey round

	Baseline				Endline			
	L-T	Intensive	Total	p	L-T	Intensiveee	Total	p
Total number in group	300	285	585		300	300	600	
Age								
15-19 years	8	6	14	0·647	3	6	9	0·524
(%)	(2·7%)	(2·1%)	(2·4%)		(1·0%)	(2·0%)	(1·5%)	
20-29 years	254	236	490		258	251	509	
(%)	(84·7%)	(82·8%)	(83·8)%)		(86·0%)	(83·7%)	(84·8%)	
30-40 years	38	43	81		39	43	82	
(%)	(12·7%)	(15·1%)	(13·8)%)		(13·0%))	(14·3%)	(13·7%)	
Number of births								
1	124	105	229	0·022	92	122	214	0·012
(%)	(41·3%)	(36·8%)	(39·1)%)		(30·7%)	(40·7%)	(35·7%)	
2	98	95	193		110	79	189	
(%)	(32·7%)	(33·3%)	(33·0)%)		(36·7%)	(26·3%)	(31·5%)	
3	53	39	92		65	57	122	
(%)	(17·7%)	(13·7%)	(15·7)%)		(21·7%)	(19·0%)	(20·3%)	
4 or more	25	46	71		33	42	75	
(%)	(8·3%)	(16·1%)	(12·1%)		(11·0%)	(14·0%)	(12·5%)	
Wealth Quintiles								
Poorest	43	141	184	<0·001	32	54	86	<0·001
(%)	(14·3)%)	(49·5%)	(31·5%)		(10·7%)	(18·0%)	(14·3%)	
Poorer	65	47	112		38	53	91	
(%)	(21·7)%)	(16·5%)	(19·1%)		(12·7%)	(17·7%)	(15·2%)	
Middle	57	36	93		55	81	136	
(%)	(19·0)%)	(12·6%)	(15·9%)		(18·3%)	(27·0%)	(22·7%)	
Richer	56	32	88		76	59	135	
(%)	(18·7%)	(11·2%)	(15·0%)		(25·3%)	(19·7%)	(22·5%)	
Richest	79	29	108		99	53	152	
(%)	(26·3%)	(10·2%)	(18·5%)		(33·0%)	(17·7%)	(25·3%)	
Religion								
Hindu	284	262	546	0·203	281	275	556	0·347
(%)	(94·7%)	(91·9%)	(93·3%)		(93·7%)	(91·7%)	(92·7%)	
Muslim/Other	16	23	39		19	25	44	
(%)	(5·3%)	(8·1%)	(6·7%)		(6·3%)	(8·3%)	(7·3%)	
Caste								
Scheduled Caste	128	147	275	<0·001	139	151	290	0·339
(%)	(42·7%)	(51·6%)	(47·0%)		(46·3%)	(50·3%)	(48·3%)	
Scheduled Tribe	1	7	8		2	5	7	
(%)	(0·3%)	(2·5%)	(1·4%)		(0·7%)	(1·7%)	(1·2%)	

General Caste	48	75	123		39	29	68	
(%)	(16·0%)	(26·3%)	(21·0%)		(13·0%)	(9·7%)	(11·3%)	
OBC	123	56	179		120	115	235	
(%)	(41·0%)	(19·6%)	(30·6%)		(40·0%)	(38·3%)	(39·2%)	
Literate								
No	34	88	122	<0·001	23	60	83	<0·001
(%)	(11·3)%)	(30·9%)	(20·9%)		(7·7%)	(20·0%)	(13·8%)	
Yes	266	197	463		277	240	517	
(%)	(88·7%)	(69·1%)	(79·1%)		(92·3%)	(80·0%)	(86·2%)	
Highest grade/class completed								
No education	39	88	127	<0·001	30	61	91	<0·001
(%)	(13·0%)	(30·9%)	(21·7%)		(10·0%)	(20·3%)	(15·2%)	
Primary or post-primary	112	117	229		136	151	287	
(%)	(37·3%)	(41·1%)	(39·1%)		(45·3%)	(50·3%)	(47·8%)	
Secondary or higher	149	80	229		134	88	222	
(%)	(49·7%)	(28·1%)	(39·1%)		(44·7%)	(29·3%)	(37·0%)	
Number of ANC visits								
No ANC	1	8	9	<0·001	0	0	0	<0·001
(%)	(0·3%)	(2·8%)	(1·5%)		(0·0%)	(0·0%)	(0·0%)	
Less than 4	98	185	283		107	97	204	
(%)	(32.%)	(64·9%)	(48·4%)		(35·7%)	(32·3%)	(34·0%)	
4 or 5	96	64	160		146	66	212	
(%)	(32·0%)	(22·5%)	(27·4%)		(48·7%)	(22·0%)	(35·3%)	
6 plus	105	28	133		47	137	184	
(%)	(35·0%)	(9·8%)	(22·7%)		(15·7%)	(45·7%)	(30·7%)	
Problems during pregnancy								
No	184	84	268	<0·001	209	212	421	0·789
(%)	(61·3%)	(29·5%)	(45·8%)		(69·7%)	(70·7%)	(70·2%)	
Yes	116	201	317		91	88	179	
(%)	(38·7%)	(70·5%)	(54·2%)		(30·3%)	(29·3%)	(29·8%)	
Facility Type								
Gov’t Health Center	200	193	393	0·786	200	200	400	1·000
(%)	(66·7%)	(67·7%)	(67·2%)		(66·7%)	(66·7%)	(66·7%)	
Gov't Hospital	100	92	192		100	100	200	
(%)	(33·3%)	(32·3%)	(32·8%)		(33·3%)	(33·3%)	(33·3%)	
Delivery Assistant								
Nurse/Doctor	112	35	147	<0·001	11	83	94	<0·001
(%)	(37.%)	(12·3%)	(25·1%)		(3·7%)	(27·7%)	(15·7%)	
Midwife/Dai	153	31	184		18	216	234	
(%)	(51·0%)	(10·9%)	(31·5%)		(6·0%)	(72·0%)	(39·0%)	
ASHA/Angawali	32	13	45		191	1	192	
(%)	(10·7%)	(4·6%)	(7·7%)		(63·7%)	(0·3%)	(32·0%)	

Other/Non-skilled attendant	3	206	209		80	0	80		
(%)	(1·0%)	(72·3%)	(35·7%)		(26·7%)	(0·0%)	(13·3%)		
Gender of delivery assistant									
Male	1	0	1	0·329	0	1	1	0·317	
(%)	(0·3%)	(0·0%)	(0·2%)		(0·0%)	(0·3%)	(0·2%)		
Female	299	285	584		300	299	599		
(%)	(99·7%)	(100·0%)	(99·8%)		(100·0%)	(99·7%)	(99·8%)		

Impact of the intervention: Total PCMC score, Change Package PCMC score, and PCMC sub-domains

Out of a 100-point scale, unadjusted overall mean PCMC score in Light Touch facilities increased 24.03 points from 63.42 (SD 11.44) at baseline to 87.47 (SD 8.31) at endline (Table 2). Mean PCMC score at Intensive facilities increased 12.01 points, from 85.02 (SD 8.12) to 97.13 (SD 2.91).

In Intensive and Light-Touch groups, there was improvement in both the Change Package indicators specifically targeted for change, and the Non-Change Package “Halo” indicators, which were not targeted. In Light-Touch facilities Change-Package PCMC score increased 20.65 points between survey rounds, from 42.71 (SD 16.15) to 83.36 (SD 13.51). In Intensive facilities they increased 26.04 points, from 69.36 (SD 12.56) to 95.4 (SD 7.61).

The Non-Change Package “Halo” indicators increase 20.16 points in Light-Touch facilities (68.65 (SD 11.87) to 88.81 (SD 8.57)); and 6.82 in Intensive facilities (91.23 (SD 8.69) to 98.05 (SD 2.14)).

Subdomains also increased in both Light-Touch and Intensive facilities (Table 2).

Table 2
Mean total PCMC and subdomain scores, by Light Touch/Intensive groups and survey round[1]

	Baseline						Endline					
	Light-Touch			Intensive			Light-Touch			Intensive		
	N	Mean	SD	N	Mean	SD	N	Mean	SD	N	Mean	SD
Total PCMC score												
PCMC total sum (23 indicators)	300	63·42	(11·44)	285	85·02	(8·12)	300	87·47	(8·31)	300	97·13	(2·91)
Change Package PCMC total sum (8 indicators)	300	42·71	(16·15)	285	69·36	(12·56)	300	83·36	(13·51)	300	95·4	(7·61)
Non-Change Package total sum (19 items)	300	68·65	(11·87)	285	91·23	(8·69)	300	88·81	(8·57)	300	98·05	(2·14)
Dignity and Respect domain subtotal (5 indicators)	300	77·42	(15·65)	285	94·41	(9·93)	300	85·33	(10·75)	300	98·22	(3·63)
Communication and Autonomy domain subtotal (7 indicators)	300	40·98	(16·24)	285	78·56	(13·06)	300	84·67	(16·19)	300	96·89	(5·37)
Supportive Care domain subtotal (11 indicators)	300	71·33	(11·57)	285	84·87	(9·82)	300	90·22	(7·24)	300	96·78	(3·00)
Specific Indicators												
Dignity and Respect Domain												
Treated with respect*	300	2·14	(0·76)	285	2·95	(0·28)	300	2·68	(0·53)	300	3	(0·00)
Visual privacy	300	1·64	(1·01)	285	2·44	(1·17)	300	2·77	(0·53)	300	2·99	(0·17)
Record confidentiality*	300	2·18	(0·90)	285	2·8	(0·64)	300	1·53	(1·18)	300	2·76	(0·51)
Verbal abuse*	300	2·69	(0·68)	285	2·98	(0·17)	300	2·89	(0·49)	300	2·99	(0·11)
Physical abuse*	300	2·96	(0·27)	285	3	(0·00)	300	2·92	(0·46)	300	3	(0·00)
Communication and Autonomy Domain												
Introduce self	300	0·09	(0·30)	285	0·36	(0·97)	300	1·87	(1·11)	300	2·61	(0·74)
Involvement in care*	300	1·08	(1·11)	285	2·82	(0·52)	300	2·49	(0·76)	300	2·93	(0·25)
Delivery position choice	300	1·22	(1·11)	285	2·81	(0·63)	300	2·92	(0·34)	300	2·91	(0·36)
Language*	300	2·45	(0·78)	285	2·62	(0·88)	300	2·76	(0·48)	300	2·97	(0·17)
Explain exams/procedures*	300	0·68	(0·91)	285	2·83	(0·49)	300	2·49	(0·77)	300	2·94	(0·24)
Explain medicines*	300	1·06	(1·24)	285	2·21	(1·19)	300	2·57	(0·72)	300	3	(0·06)
Able to ask questions*	300	2·02	(0·91)	285	2·85	(0·55)	300	2·68	(0·51)	300	2·98	(0·15)
Supportive Care Domain												
Time to care*	300	2·44	(0·78)	285	3	(0·00)	300	2·84	(0·43)	300	2·91	(0·30)
Labor support*	300	2·75	(0·57)	285	2·89	(0·41)	300	2·96	(0·20)	300	3	(0·00)
Delivery support*	300	2·72	(0·60)	285	2·92	(0·42)	300	2·98	(0·14)	300	3	(0·00)
Attention when need help*	300	1·98	(0·80)	285	2·85	(0·47)	300	2·65	(0·49)	300	2·99	(0·10)
Bribes*	300	2·28	(0·71)	285	1·35	(1·24)	300	2·65	(0·68)	300	2·55	(0·60)
Control pain*	300	1·61	(0·80)	285	2·45	(1·03)	300	2·68	(0·48)	300	2·95	(0·22)
Enough staff*	300	1·87	(0·70)	285	2·77	(0·70)	300	2·53	(0·57)	300	2·98	(0·25)
Took best care*	300	1·81	(0·62)	285	2·86	(0·46)	300	2·59	(0·50)	300	2·99	(0·11)
Trust*	300	2·14	(0·81)	285	2·94	(0·32)	300	2·82	(0·42)	300	2·97	(0·16)
Clean bathroom	300	1·68	(0·62)	285	1·06	(1·29)	300	2·17	(0·51)	300	2·61	(0·51)
Safe*	300	2·26	(0·81)	285	2·93	(0·31)	300	2·89	(0·31)	300	2·99	(0·10)

Change Package												
Introduction	300	0·09	(0·30)	285	0·36	(0·97)	300	1·97	(1·13)	300	2·61	(0·74)
Privacy	300	1·64	(1·01)	285	2·44	(1·17)	300	2·71	(0·63)	300	2·99	(0·17)
Position of choice	300	1·22	(1·11)	285	2·81	(0·63)	300	2·92	(0·34)	300	2·85	(0·48)
Clean bathroom	300	1·68	(0·62)	285	1·06	(1·29)	300	2·59	(0·76)	300	2·83	(0·57)
Explain test and medicine purpose	300	0·89	(0·97)	285	2·21	(1·19)	300	2·38	(0·92)	300	2·85	(0·51)
Pain medicines given when needed	300	1·27	(0·83)	285	2·45	(1·03)	300	2·29	(0·84)	300	2·99	(0·13)
Helped to the toilet	300	1·31	(1·25)	285	2·68	(0·76)	300	2·41	(1·07)	300	2·88	(0·48)
Clean post-natal care ward	300	2·15	(0·86)	285	2·64	(0·76)	300	2·74	(0·48)	300	2·89	(0·33)

[1] Total, change package, non-change package and subdomain scores were scaled to a 100-point scale

*Denotes Non-change package indicator

Adjusting for demographic characteristics, facility type, provider factors, and pregnancy complications, the increase in mean total PCMC scores at Light Touch facilities over time was greater than Intensive facilities (Figure 1). Compared to Intensive intervention facilities, the Light Touch facilities' adjusted total PCMC scores increased an average of 16.15 points (95% CI: 13.47, 18.83) (Table 3; Table 4). For the Change Package PCMC score, Light Touch facilities increased 11.75 points more (95% CI: 7.33, 16.17) compared to Intensive intervention facilities across survey rounds. Non-change Package score at Light Touch facilities increased 16.79 points (95%CI: 14.12, 19.45) relative to Intensive facilities between survey rounds (Figure 2).

Table 3
Difference-in-differences analyses to assess the impact of Light Touch on PCMC scores compared to intervention (total and change packet)[1]

	Survey Round: Endline (reference Baseline)	Treatment Group: Light Touch (reference Intensive Intervention)	Interaction term
Full PCMC score, 23 items (unadjusted)			
Coefficient	12·10	-21·60	11·95
95%CI	(10·76, 13·45)	(-22·95, -20·26)	(10·06, 13·84)
p-value	0·000	0·000	0·000
Full PCMC score, 23 items (adjusted)			
Coefficient	9·16	-23·27	16·15
95%CI	(7·50, 10·83)	(-25·02, -21·51)	(13·47, 18·83)
p-value	0·000	0·000	0·000
Change Package score, 8 items (adjusted)			
Coefficient	26·94	-25·52	11·75
95%CI	(24·03, 29·85)	(-28·33, -22·70)	(7·33, 16·17)
p-value	0·000	0·000	0·000
Non-Change Package score, 19 items (adjusted)			
Coefficient	4·54	-23·70	16·79
95%CI	(2·88, 6·21)	(-25·49, -21·91)	(14·12, 19·45)
p-value	0·000	0·000	0·000
Dignity & Respect (adjusted)			
Coefficient	5·21	-15·07	1·01
95%CI	(2·26, 8·16)	(-18·05, -12·09)	(-3·84, 5·86)
p-value	0·001	0·000	0·683
Communication and Autonomy (adjusted)			
Coefficient	18·84	-40·90	27·78
95%CI	(15·77, 21·90)	(-44·01, -37·79)	(22·86, 32·70)
p-value	0·000	0·000	0·000
Supportive Care (adjusted)			
Coefficient	15·53	-12·07	3·29
95%CI	(13·89, 17·18)	(-13·86, -10·28)	(0·67, 5·92)
p-value	0·000	0·000	0·014

[1] Adjusted estimates controlled for age, parity, education, wealth, religion, caste, facility type, delivery provider, ANC visits, and pregnancy complications. Robust standard errors were used.

Table 4
Mean PCMC scores of facilities by Light Touch/Intensive groups and survey round (unadjusted)

	Baseline						Endline						Unadjusted difference
	Light-Touch			Intensive			Light Touch			Intensive			
	N	Mean	SD	N	Mean	SD	N	Mean	SD	N	Mean	SD	
Facility													
L-T_1 PHC	100	70·65	(7·38)				100	89·29	(5·07)				18·64
L-T_2 CHC	100	67·84	(7·19)				100	93·78	(4·44)				25·94
L-T_3 CHC	100	51·77	(8·93)				100	79·33	(7·27)				27·56
Int_1 PHC				105	86·87	(6·73)				100	97·67	(2·64)	10·8
Int_2 CHC				92	82·14	(10·46)				100	97·23	(3·14)	15·09
Int_3 CHC				88	85·84	(5·75)				100	96·48	(2·85)	10·64

Discussion

These results contribute to broader QI efforts by demonstrating that a light touch, less intensive QI method may improve women's experiences of care. Person-centered care, as measured through self-reported patient experience during childbirth, improved significantly at all three facilities which received a year-long, intensively supported team-based collaborative QI intervention. PCMC also improved significantly at all three facilities which subsequently participated in a six-month-long Light Touch phase, with limited and decreasing external support and lower demands on time and input from facility staff and clinicians.

The Intensive facilities, beginning from a higher baseline PCMC score than the Light-Touch facilities, and limited by the upper bound of the scale, were constrained in the absolute potential improvement they could achieve. However, these results are particularly noteworthy for facilities in low-resource settings where a full QI methodology may not be feasible.

Our findings show only minor differences between the set of activities within the PCMC Scale which are measures of specifically targeted processes included in the "Change Package", and therefore emphasized for improvement during both Intensive and Light Touch phases, and the remaining 19 indicators within the PCMC scale which measure activities or behaviors not targeted for change. Results indicate that PCMC included both for Change-Package specific indicators as well as for non-Change-Package indicators. In fact, the change in increase in PCMC was higher for non-Change Package indicators. The greatest change in PCMC score was for the Communication & Autonomy sub-domain of PCMC. This may be due to the greater ability of providers to change interpersonal behaviors such as calling the patient by their name or introducing themselves as opposed to broader health facility environment changes (i.e. Supportive care sub-domain) or respect and dignity.

This study has a number of limitations. First, there wereonly a small number of facilities in each arm; however, we made an effort to match both arms based on existing facility information. Second, all the facilities had also previously been part of a major quality of care Intervention focused on improving clinical quality for delivery through use of a validated childbirth checklist [REF Better Birth]. As a result, the responsiveness to change interventions among staff may not be reflective of facilities that don't have this prior experience. Moreover, broader government-focused initiatives on quality improvement may have influenced these results. For example, a government-sponsored, national campaign to improve the cleanliness of public facilities during the period of the intervention may have influenced results in PCMC indicators focused on cleanliness of the washrooms and postnatal wards across both arms. Also towards the end of the Intensive phase, the project's facilities also received attention to a phased expansion of Government of India's national initiative to improve the clinical and experiential quality of care in labor rooms and maternity hospitals(25). This may have influenced the receptiveness of facility leadership to the improvement Interventions in this study, particularly in the light-touch phase. Third, there may have been a Hawthorne effect, through which facility staff changed the intervention activities knowing they would be assessed. We attempted to control for this by measuring aspects of PCMC which were not the target of intervention actions and comparing across the two groups.

Conclusion

The sustained time commitment by facility staff and clinicians, and the transport and external expertise needed to lead a facility through the team-based Quality Improvement efforts to develop effective process changes are all necessary for effective initiatives. The costs are high, however, and are likely the reason that QI initiatives are increasingly common in OECD countries, and remain rare in Low- and Middle-Income Countries (LMICs). QI interventions do not appear to have changed practices widely in LMICs. We assume that the cost and complexity of implementation is at least part of the reason for this. Added to this already significant barrier, acknowledging, measuring, and improving person-centered care is more challenging than clinical care in all settings. Where competition for limited resources exists, prioritizing infrastructure and clinical care improvements often takes precedence for both health and political reasons.

In this context, our findings are particularly important. This study provides evidence that once effective process changes are identified through a locally developed “Change Package” they can be effectively introduced into facilities without long-duration, high-intensity, support, and that this ‘lighter-touch’, less expensive, method of introduction can achieve similar outcomes. This offers a major opportunity for health systems where demonstrated packages of process changes have been identified to replicate and spread that package of changes widely. In addition, the development of a local change package with its high cost may be more acceptable if there is evidence its benefits can be spread across a much wider system with modest marginal costs.

Beyond this, our research provides insights into an important question about whether PCMC interventions change only specific, targeted, behaviors, or change overall attitudes and practices which effect how providers interact with patients more broadly. This shows that the positive changes in provider and staff practices on actions such as assuring cleanliness and calling patients by name – identified, defined, and targeted for change through collaborative process (Intensive intervention) – spurred a way of interacting with patients which led to more broad-reaching changes in how providers and staff engaged with patients. Using the patients’ preferred language when speaking to them, assuring patients were informed about the intent of interventions or the results of tests: these kinds of actions also improved even though not the focus of change actions identified through the intervention. Taken together, these results provide evidence for improving PCMC in a low-resource setting.

Abbreviations

ANC Antenatal Care

CHC Community Health Center

LMIC Low- and Middle-Income Countries

MMR Maternal mortality rates

NHM National Health Mission

OECD Organization for Economic Co-operation and Development

PCMC Person-centered maternity care

PHC Primary Health Center

QI Quality Improvement

Declarations

Ethics Approval and Consent to Participate

Human subjects approval for this study was received in both the United States, from the University of California, San Francisco (IRB# 15-18008, ref 176940; 11/09/2016), and in India, from the Public Health Foundation of India (TRC-IEC-276/15; May 2, 2016). All study participants were read an informed consent form in their language of choice, and their agreement confirmed prior to enrollment.

Consent for publication

Not applicable

Availability of supporting data

The datasets generated and/or analyzed during the current study are available at the Dryad repository. https://datadryad.org/stash [to be uploaded on May 22, 2020]

Competing interests

The authors declare that they have no competing interests

Funding

This study was funded by a grant from the Bill and Melinda Gates Foundation. The Foundation was not involved in guiding site selection, study design, analsyis, or interpretation of results.

Authors' contributions

DM and MS led the overall study design. DM lead the writing of the manuscript and MN led the analysis. CG and KG led the intervention methods development, intervention design, and supervision, with support from KPR and KS. ABS, KG, and KPR led data collection. MN and MS led the data analysis. KG, MN, CG, and MS all contributed to the writing. All authors provided input on data interpretation, editing, and approved the final manuscript.

Acknowledgements

We are gateful to the data collection teams and staff in the Uttar Pradesh facilities whom we worked with, as well as the patients who generously gave their time and attention to participate in this study.

Authors' information

Not applicable

References

1. Office of the Registrar General & Census Commissioner. MMR Bulletin-2014-16.pdf [Internet]. 2018 [cited 2019 Sep 16]. Available from: http://www.censusindia.gov.in/vital_statistics/SRS_Bulletins/MMR%20Bulletin-2014-16.pdf
2. Montagu D, Sudhinaraset M, Diamond-Smith N, Campbell O, Gabrysch S, Freedman L, et al. Where women go to deliver: understanding the changing landscape of childbirth in Africa and Asia. Health Policy and Planning. 2017 Oct 1;32(8):1146–52.
3. Diamond-Smith N, Sudhinaraset M. Drivers of facility deliveries in Africa and Asia: regional analyses using the demographic and health surveys. Reproductive Health. 2015;12(1):6.
4. Bhattacharyya S, Srivastava A, Roy R, Avan BI. Factors influencing women's preference for health facility deliveries in Jharkhand state, India: a cross sectional analysis. BMC Pregnancy and Childbirth [Internet]. 2016 Dec [cited 2019 Jan 13];16(1). Available from: http://bmcpregnancychildbirth.biomedcentral.com/articles/10.1186/s12884-016-0839-6
5. Sudhinaraset M, Treleaven E, Melo J, Singh K, Diamond-Smith N. Women's status and experiences of mistreatment during childbirth in Uttar Pradesh: a mixed methods study using cultural health capital theory. BMC Pregnancy Childbirth. 2016 Dec;16(1):332.
6. Kruk ME, Kujawski S, Moyer CA, Adanu RM, Afsana K, Cohen J, et al. Next generation maternal health: external shocks and health-system innovations. The Lancet. 2016 Nov;388(10057):2296–306.
7. Tunçalp ö, Were W, MacLennan C, Oladapo O, Gülmezoglu A, Bahl R, et al. Quality of care for pregnant women and newborns-the WHO vision. BJOG: An International Journal of Obstetrics & Gynaecology. 2015 Jul;122(8):1045–9.
8. Afulani PA, Diamond-Smith N, Golub G, Sudhinaraset M. Development of a tool to measure person-centered maternity care in developing settings: validation in a rural and urban Kenyan population. Reproductive Health [Internet]. 2017 Dec [cited 2018 Jul 4];14(1). Available from: http://reproductive-health-journal.biomedcentral.com/articles/10.1186/s12978-017-0381-7
9. Raj A, Dey A, Boyce S, Seth A, Bora S, Chandurkar D, et al. Associations Between Mistreatment by a Provider during Childbirth and Maternal Health Complications in Uttar Pradesh, India. Maternal and Child Health Journal. 2017 Sep;21(9):1821–33.
10. Sudhinaraset M, Landrian A, Afulani PA, Diamond-Smith N, Golub G. Association between person-centered maternity care and newborn complications in Kenya. Int J Gynecol Obstet. 2019 Oct 9;ijgo.12978.
11. National Family Health Survey -4. Mumbai, India: International Institute for Population Science; 2016.
12. Sharma G, Penn-Kekana L, Halder K, Filippi V. An investigation into mistreatment of women during labour and childbirth in maternity care facilities in Uttar Pradesh, India: a mixed methods study. Reprod Health. 2019 Dec;16(1):7.
13. Singh S, Doyle P, Campbell OM, Mathew M, Murthy GVS. Referrals between Public Sector Health Institutions for Women with Obstetric High Risk, Complications, or Emergencies in India – A Systematic Review. Ho Y-S, editor. PLoS ONE. 2016 Aug 3;11(8):e0159793.
14. Sudhinaraset M, Beyeler N, Barge S, Diamond-Smith N. Decision-making for delivery location and quality of care among slum-dwellers: a qualitative study in Uttar Pradesh, India. BMC Pregnancy Childbirth. 2016 Dec;16(1):148.
15. Semrau KEA, Hirschhorn LR, Marx Delaney M, Singh VP, Saurastri R, Sharma N, et al. Outcomes of a Coaching-Based WHO Safe Childbirth Checklist Program in India. New England Journal of Medicine. 2017 Dec 14;377(24):2313–24.

16. Barnhart DA, Spiegelman D, Zigler CM, Kara N, Marx Delaney M, Kalita T, et al. Coaching Intensity, Adherence to Essential Birth Practices, and Health Outcomes in the BetterBirth Trial in Utter Pradesh, India. Glob Health Sci Pract. 2020 Mar 3;GHSP-D-19-00317.
17. Cations M, Crotty M, Fitzgerald JA, Kurrle S, Cameron ID, Whitehead C, et al. Agents of change: establishing quality improvement collaboratives to improve adherence to Australian clinical guidelines for dementia care. Implementation Sci. 2018 Dec;13(1):123.
18. on behalf of the EPOCH trial group, Stephens TJ, Peden CJ, Pearse RM, Shaw SE, Abbott TEF, et al. Improving care at scale: process evaluation of a multi-component quality improvement intervention to reduce mortality after emergency abdominal surgery (EPOCH trial). Implementation Sci. 2018 Dec;13(1):142.
19. Stephens T, Johnston C, Hare S. Quality improvement and emergency laparotomy care: what have we learnt from recent major QI efforts? Clin Med. 2019 Nov;19(6):454–7.
20. El-Khani A, Maalouf W, Baker DA, Zahra N, Noubani A, Cartwright K. Caregiving for children through conflict and displacement: a pilot study testing the feasibility of delivering and evaluating a light touch parenting intervention for caregivers in the West Bank. Int J Psychol. 2020 Jan;55(S1):26–39.
21. IHI's Collaborative Model for Achieving Breakthrough Improvement. [Internet]. Boston: Institute for Healthcare Improvement; 2003 [cited 2019 Sep 29]. (IHI Innovation Series). Available from: http://www.ihi.org/resources/Pages/IHIWhitePapers/TheBreakthroughSeriesIHIsCollaborativeModelforAchievingBreakthroughImprovement.aspx
22. The Breakthrough Series: IHI's Collaborative Model for Achieving Breakthrough Improvement. Diabetes Spectrum. 2004 Apr 1;17(2):97–101.
23. UCSF IGHS. UCSF SPARQ PROJECT [Internet]. UCSF SPARQ PROJECT. 2017 [cited 2020 Apr 30]. Available from: https://globalhealthsciences.ucsf.edu/our-work/diseases-and-conditions/maternal-and-newborn-child-health/sparq-strengthening-people
24. Afulani PA, Diamond-Smith N, Phillips B, Singhal S, Sudhinaraset M. Validation of the person-centered maternity care scale in India. Reprod Health. 2018 Dec;15(1):147.
25. National Health Systems Resource Center. LaQshya Labor Room Quality Improvement Initiative Guideline [Internet]. LaQysha. [cited 2018 Jul 1]. Available from: http://nhsrcindia.org/updates/laqshya-□□□□□-labour-room-quality-improvement-initiative-guideline

Figures

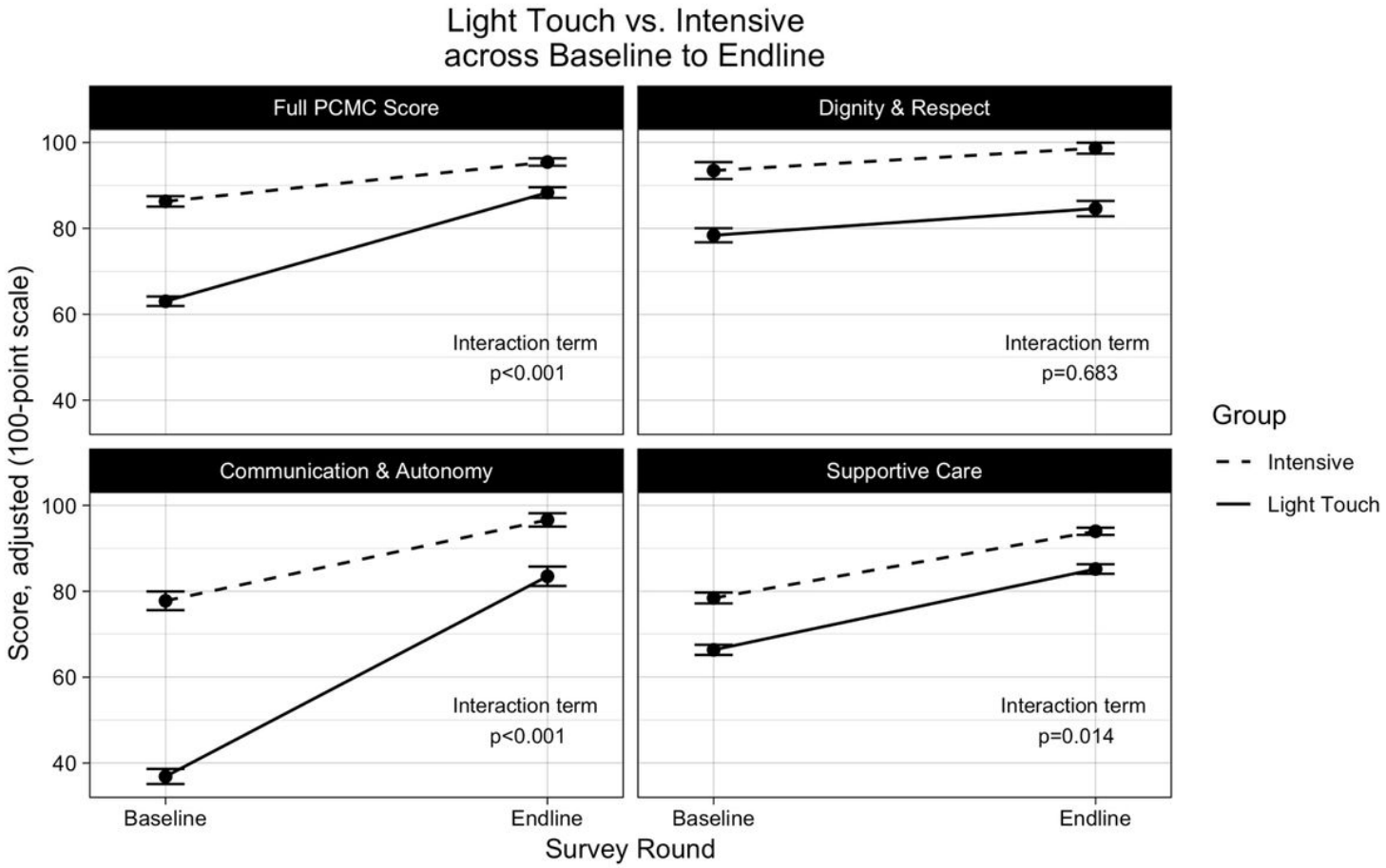

Figure 1

Mean adjusted PCMC scores, by survey round and Light Touch/Intensive sites

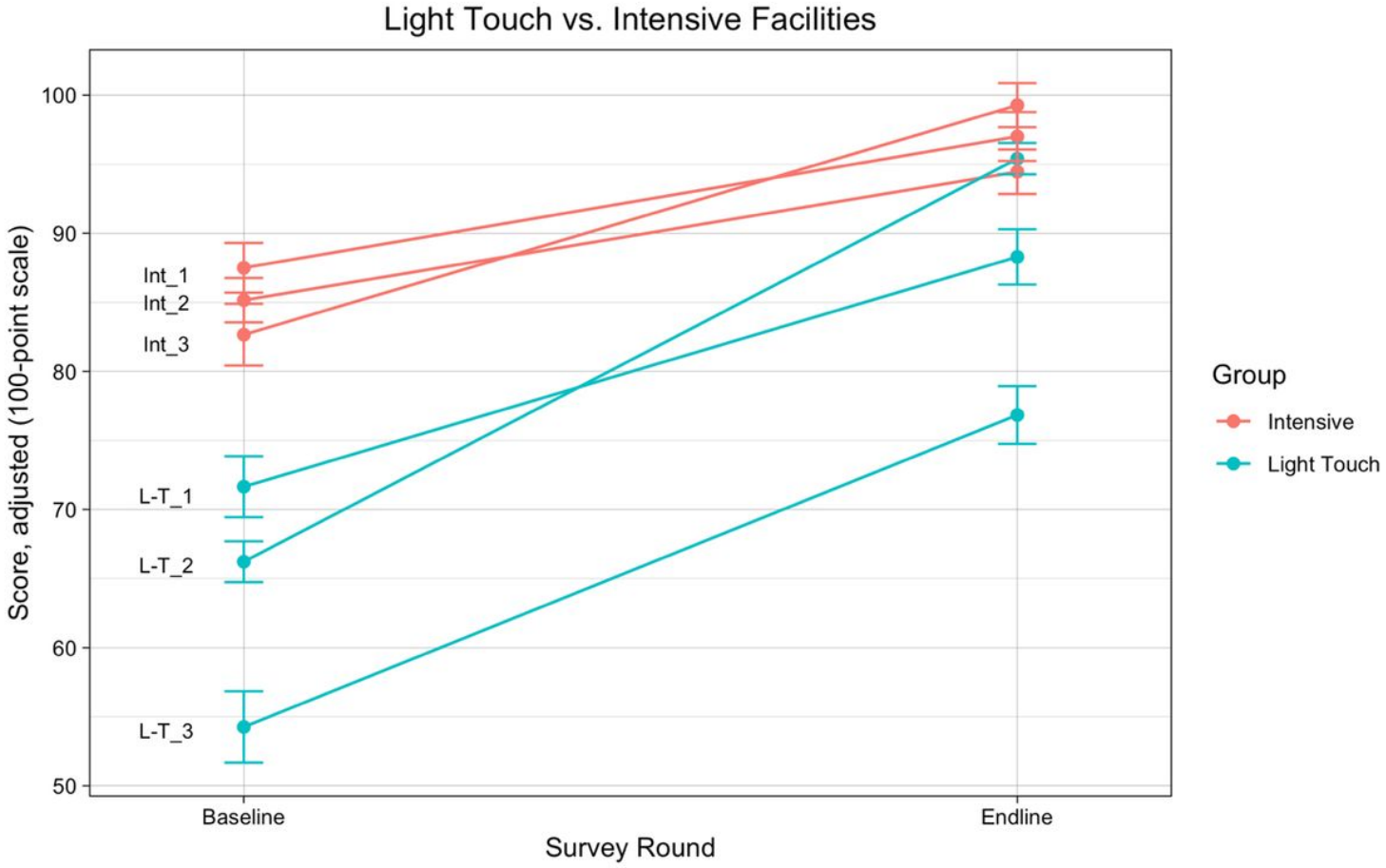

Figure 2

Mean adjusted PCMC scores by facility and survey round

Supplementary Files

This is a list of supplementary files associated with this preprint. Click to download.

- SQUIRE2.0checklist.pdf