Postpartum recovery of nulliparous women following scheduled cesarean delivery and spontaneous vaginal delivery: a prospective observational study

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BACKGROUND: Inpatient postpartum recovery trajectories following cesarean delivery and spontaneous vaginal delivery are underexplored.
OBJECTIVE: This study primarily aimed to compare recovery following cesarean delivery and spontaneous vaginal delivery in the first postpartum week, and secondarily to evaluate psychometrically the Japanese version of the Obstetric Quality of Recovery-10 scoring tool.
STUDY DESIGN: Following institutional review board approval, the EQ-5D-3L (EuroQoL 5-Dimension 3-Level) questionnaire and a Japanese version of the Obstetric Quality of Recovery-10 measure were used to evaluate inpatient postpartum recovery in uncomplicated nulliparous parturients delivering via scheduled cesarean delivery or spontaneous vaginal delivery.
RESULTS: A total of 48 and 50 women who delivered via cesarean delivery and spontaneous vaginal delivery, respectively, were recruited. Women delivering via scheduled cesarean delivery experienced significantly worse quality of recovery on days 1 and 2 compared with those who had spontaneous vaginal delivery. Quality of recovery significantly improved daily, plateauing at days 4 and 3 for cesarean delivery and spontaneous vaginal delivery groups, respectively. Compared with cesarean delivery, spontaneous vaginal delivery was associated with prolonged time to analgesia requirement, decreased opioid consumption, reduced antiemetic requirement, and reduced times to liquid/solid intake, ambulation, and discharge. Obstetric Quality of Recovery-10-Japanese is a valid (correlates with the EQ-5D-3L including a global health visual analog scale, gestational age, blood loss, opioid consumption, time until first analgesic request, liquid/solid intake, ambulation, catheter removal, and discharge), reliable (Cronbach alpha=0.88; Spearman–Brown reliability estimate=0.94; and intraclass correlation coefficient=0.89), and clinically feasible (98% 24-hour response rate) measure.
CONCLUSION: Inpatient postpartum recovery is significantly better in the first 2 postpartum days following spontaneous vaginal delivery compared with scheduled cesarean delivery. Inpatient recovery is largely achieved within 4 and 3 days following scheduled cesarean delivery and spontaneous vaginal delivery, respectively. Obstetric Quality of Recovery-10-Japanese is a valid, reliable, and feasible measure of inpatient postpartum recovery.

Key words: cesarean delivery, nulliparous, patient-reported outcome measure, postpartum recovery, vaginal delivery

Introduction

Childbirth is the most common indication for hospital admission among women of reproductive age, with an estimated 100 million patients delivering vaginally and 30 million via cesarean delivery (CD) worldwide each year.[1] Despite the high frequency of childbirth, recovery profiles following different delivery modes are underexplored.

Inpatient quality of postpartum recovery can be evaluated using the validated Obstetric Quality of Recovery-10 (ObsQoR-10) patient-reported outcome measure (PROM).[2–5] Several translated

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AJOG MFM at a Glance

Why was this study conducted?

Limited data are available to inform clinicians regarding recovery trajectories beyond the first 24 hours postpartum. The Japanese version of the Obstetric Quality of Recovery-10 scoring tool has not been assessed for validity, reliability, responsiveness, and feasibility.

Key findings

In nulliparous women, inpatient postpartum recovery is largely achieved within 3 and 4 days following spontaneous vaginal delivery and scheduled cesarean delivery, respectively. There is no significant difference in quality of recovery between these delivery modes after day 3 postpartum. Obstetric Quality of Recovery-10-Japanese is a valid, reliable, responsive, and feasible measure.

What does this add to what is known?

Findings from this study can be used as a starting point to determine when patients could be appropriately discharged after recovery from childbirth.

versions of ObsQoR-10 (Hebrew and Portuguese) have been developed and validated since the original version in English.[6,7] Because of the relatively short postpartum length of stay in many countries, limited data are available to inform clinicians regarding recovery trajectories beyond the first 24 hours postpartum. Such information regarding postpartum recovery could facilitate discharge planning, help manage patient expectations, and inform patient−provider decision-making surrounding mode of delivery. Length of hospital stay in Japanese institutions remains longer compared with institutions in most Western countries, often exceeding 7 and 5 days following cesarean and spontaneous vaginal delivery (SVD), respectively. Therefore, this population is ideally suited for evaluating and comparing quality of recovery between delivery modes.

The primary aim of this study was to compare the quality of recovery of nulliparous women delivering via uncomplicated scheduled CD and SVD in the first 7 days postpartum. Secondary aims were to determine the median time taken to recover following each delivery mode (no significant difference in ObsQoR-10 score), assess differences in recovery between delivery modes on each postpartum day, and evaluate the validity, reliability, responsiveness, and feasibility of the ObsQoR-10 Japanese version (ObsQoR-10-Japanese).

Methods

We performed a prospective observational study following approval by the Institutional Review Board at the Saitama Medical Center, Saitama Medical University (IRB#2432, Kawagoe, Japan) and registration at umin.ac.jp on September 30, 2020 (UMIN000043032). Written informed consent for study participation was obtained from all the enrolled parturients.

We recruited Japanese-speaking nulliparous women aged ≥18 years, with gestational age ≥37 weeks, who delivered a live neonate via uncomplicated scheduled CD or SVD. Exclusion criteria were as follows: mothers who required intensive care unit stay after delivery, age <18 years, lack of Japanese proficiency (spoken, reading, and writing), preterm delivery, failed neuraxial anesthesia for CD, general anesthesia or intrapartum/urgent CD, operative vaginal delivery, intrauterine fetal demise, multiparity, and refusal to participate in the study.

Translation of ObsQoR-10 from English to Japanese

The translation process was based on the dual panel method as previously described.[8] Six English-fluent Japanese physicians, including 2 who possess a medical license in English-speaking countries (Y.M. and K.A.) and 1 board-certified obstetrician (S.N.), independently translated the original version of ObsQoR-10 from English to Japanese. Each translated phrase of every single part was anonymously listed in an integrated spreadsheet and circulated to the team. A meeting was then conducted to translate the phrases. We recruited 10 postpartum women following verbal consent to answer the preliminary questionnaire assessing the Japanese questions. After modifying the original version incorporating feedback from the health care consumers, we developed the ObsQoR-10-Japanese (Supplemental Figure).

Protocol

We approached eligible women within 24 hours postpartum on the perinatal wards to obtain formal consent. Following written consent, we extracted the following data: baseline demographics (age, height, weight, body mass index [BMI], gestational age, ethnicity, gravidity, obstetrical and medical comorbidities); duration of labor (first, second, and third), onset of labor (spontaneous or induced), oxytocin augmentation, estimated blood loss, perineal tear, episiotomy for vaginal delivery; indication for CD, duration of the procedure, type of neuraxial anesthesia, fluid balance, transfusion, antiemetics, supplemental analgesics or sedatives for CD; and neonatal outcomes. The participants completed ObsQoR-10-Japanese 24 hours after delivery and a Japanese-version EQ-5D-3L (EuroQol 5-Dimension 3-Level) survey including a global health visual analog scale score (GHVAS) from 0 to 100 (0=worst imaginable health and 100=best imaginable health). All participants also answered the ObsQoR-10-Japanese at 25 hours after delivery, and then daily until day 7 postpartum. In the event of discharge before day 7, patients were emailed and encouraged to complete an electronic version of ObsQoR-10-Japanese using SurveyMonkey (http://www.surveymonkey.com).

Outcomes

The primary outcome of this study was the ObsQoR-10-Japanese score compared between delivery modes (scheduled CD vs SVD) in the first 7 days

postpartum. We hypothesized that women delivering via SVD would have significantly better recovery at all postpartum time points up to 1 week postpartum (higher ObsQoR-10-Japanese scores). Secondary outcomes included median time taken for inpatient recovery (time to plateau/no significant improvement of ObsQoR-10-Japanese score for individual patients delivering via each delivery mode), differences in recovery scores between delivery modes at each postpartum time point, and other recovery metrics (first analgesic requirement, oral intake [fluid and solid], first ambulation, urinary catheter removal, and time from delivery to discharge) compared between delivery modes. We also sought to psychometrically assess the ObsQoR-10-Japanese as outlined below.

Psychometric assessment of the ObsQoR-10-Japanese

To evaluate validity, reliability, responsiveness, and clinical feasibility of the ObsQoR-10-Japanese, we conducted the following psychometric assessments:

1. The correlation between 24-hour ObsQoR-10-Japanese, EQ-5D-3L, and GHVAS was assessed to determine convergent validity. For discriminant validity, comparison was made between the 24-hour ObsQoR-10-Japanese scores of women who had a "good" and a "poor" postoperative recovery, defined by GHVAS of ≥70 and <70 at 24 hours, respectively. Hypothesis testing included difference in day-1 ObsQoR-10-Japanese scores between delivery modes and correlation of the 24-hour ObsQoR-10-Japanese score with patient age, BMI, duration of labor, peripartum estimated blood loss, and maternal and fetal complications.
2. Reliability as a measure of consistency was assessed by evaluating internal consistency of the ObsQoR-10-Japanese measured using Cronbach alpha and interitem correlation tests. Split-half reliability of final ObsQoR-10-Japanese was assessed by evaluating the correlation between random split segments. The test−retest reliability of the ObsQoR-10-Japanese was assessed by determining the correlation between 24- and 25-hour ObsQoR-10-Japanese scores in the same patients. Floor and ceiling effects of ObsQoR-10-Japanese were assessed by evaluating whether <15% of respondents achieved highest (100) or lowest (0) possible scores.
3. Responsiveness was evaluated by determining differences of ObsQoR-10-Japanese score at different time points in line with our hypothesis that quality of recovery would improve following day 1 postpartum.
4. Clinical feasibility was assessed by determining successful completion rate of the ObsQoR-10-Japanese.

Sample size calculation

Adequate sample sizes and a priori power calculations are essential for well-designed studies. The sample size justification for this study was guided by previous studies.[1,2] A mean difference in the ObsQoR-10 score of 8 (standard deviation [SD] 14) was reported between CD and SVD in a recently published study in an American postpartum population. Allowing for a dropout rate of 5%, 100 participants (50 women delivering via scheduled CD and 50 via SVD) would be needed to demonstrate a difference in ObsQoR-10-Japanese score, with an alpha error of 0.05 and power of 80%.

Statistics

Data are presented as mean (SD), median [interquartile range], number (percentage), and 95% confidence intervals (CIs) as appropriate. Continuous data were tested for normality using the Shapiro−Wilk normality test, with all percentages rounded up to the nearest integer. Correlations between ObsQoR-10-Japanese questionnaire items and GHVAS were determined using Spearman rank correlation coefficient. Nonparametric data were compared using the Wilcoxon signed-rank test. Internal consistency was measured with Cronbach alpha and split-half reliability. Test−retest reliability was measured by intraclass correlation coefficient (ICC). Responsiveness was assessed using a repeated-measures mixed-effects model to compare the ObsQoR-10 score between the vaginal and cesarean delivery group over time. Statistical analysis was performed using GraphPad Prism, version 7.0 (GraphPad Software Inc., San Diego, CA). The null hypothesis was rejected if 2-tailed P values were <.05.

Results

During the study period, 103 patients were approached, 100 were recruited, and 98 patients completed the study. Two patients in the CD group refused to complete the surveys and withdrew from the study. We analyzed data from 98 parturients (Figure 1). Table 1 summarizes patient characteristics of women included in the study. There were no significant differences in demographics between patients undergoing scheduled CD and those undergoing SVD. The ObsQoR-10-Japanese scores for each delivery mode (scheduled CD vs SVD) in the first 7 days postpartum are provided in Figure 2. Times taken for inpatient recovery (time to plateau of ObsQoR-10-Japanese score, where no significant difference in score was demonstrated in subsequent days) following scheduled CD and SVD were 4 and 3 days, respectively. Women delivering via SVD demonstrated significantly better recovery on days 1 and 2 postpartum.

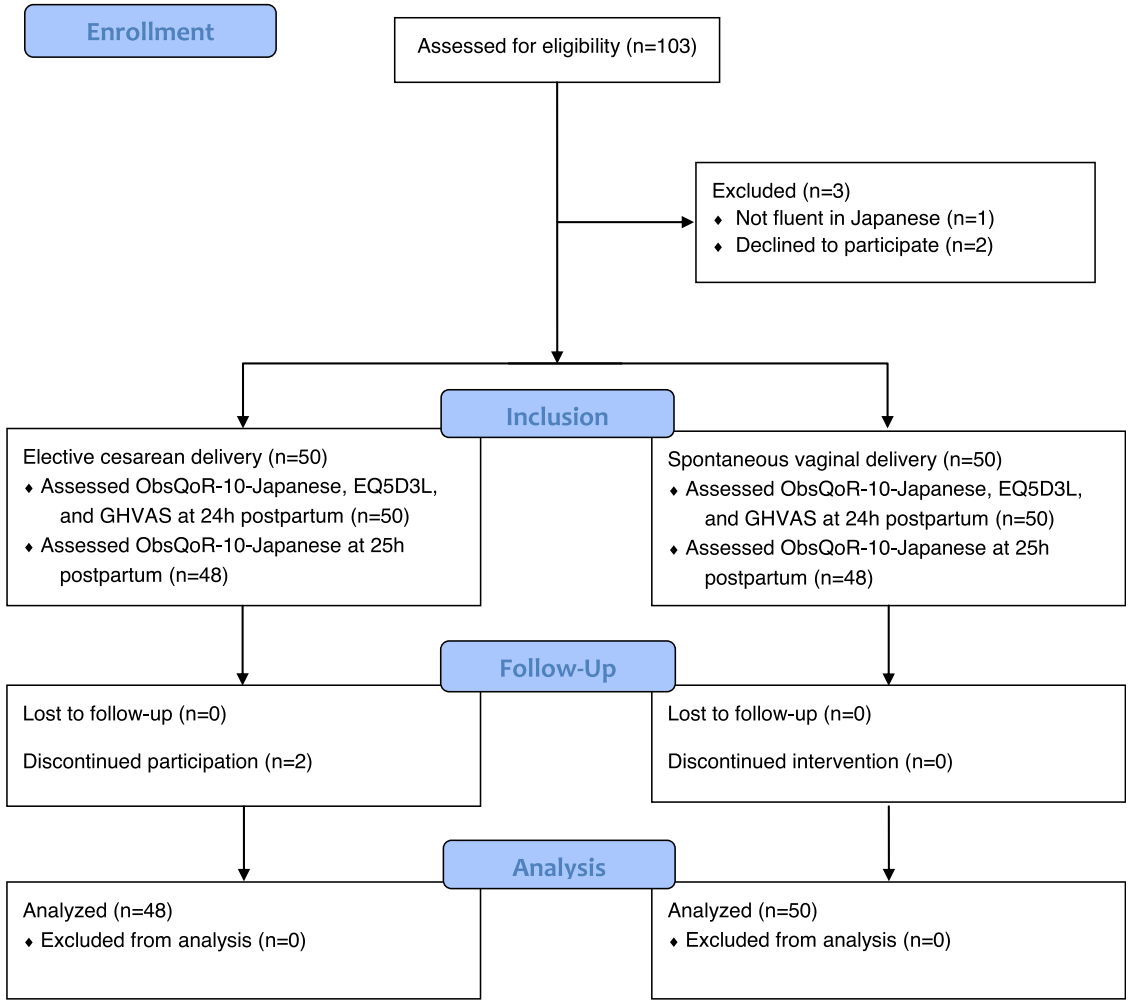
Additional recovery metrics (first analgesic requirement, oral intake [fluid and solid], first ambulation, urinary catheter removal, and time from delivery to discharge) for each delivery mode are provided in Table 2.

Psychometric assessment of ObsQoR-10-Japanese

Validity.

1. Convergent validity: ObsQoR-10-Japanese correlated strongly with EQ-5D-3L (r=−0.722 [95% CI, −0.815 to −0.576]; P<.001) and moderately with GHVAS (r=0.626 [95% CI, 0.471−0.749]; P<.001) at 24 hours.

FIGURE 1
STROBE flow diagram



EQ5D3L, EuroQoL 5-Dimension 3-Level; *GHVAS*, global health visual analog scale; *ObsQoR-10-Japanese*, Obstetric Quality of Recovery-10, Japanese version; *STROBE*, Strengthening the Reporting of Observational Studies in Epidemiology.

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2. Discriminant validity: ObsQoR-10 discriminated between good and poor recovery (GHVAS ≥70 vs <70; difference in mean scores, 24.6 [95% CI, 15.15−34.06]; *P*<.001).
3. Hypothesis testing: 24-hour ObsQoR-10-Japanese scores were higher on day 1 following SVD compared with CD (72.5 [95% CI, 67.5−77.5] vs 48.0 [95% CI, 43.2−52.7]; *P*<.001) and correlated with gestational age (r=0.426 [95% CI, 0.246−0.579]; *P*<.001) and SVD blood loss (r=−0.432 [95% CI, −0.631 to −0.152]; *P*=.001), elective CD blood loss (r=−0.330 [95% CI, −0.566 to −0.074]; *P*=.009), time until first analgesic request (r=0.417 [95% CI, 0.242−0.591]; *P*<.001), morphine consumption (r=−0.283 [95% CI, −0.421 to −0.075]; *P*=.001), time to first fluid intake (r=−0.525 [95% CI, −0.652 to −0.364]; *P*<.001), time to ambulation (r=−0.571 [95% CI, −0.693 to −0.428]; *P*<.001), time to first solid food intake (r=−0.571 [95% CI, −0.660 to −0.415]; *P*<.001), time to urinary catheter removal (r=−0.319 [95% CI, −0.539 to −0.057]; *P*=.011), and time to discharge (r=−0.538 [95% CI, −0.661 to −0.397]; *P*<.001).
4. Cross-cultural validity: differential item functioning analysis suggested significant differences in the functioning of the instrument across the 2 samples (United States vs Japan). All items except item 1 showed some degree of differential item functioning (*P*<.05 for item 6; *P*<.01 for all other items).

Reliability.

1. Internal consistency was good (Cronbach alpha=0.876), with moderate interitem correlation (r=0.415).
2. Split-half reliability was very good (Spearman−Brown prophecy reliability estimate=0.938).

TABLE 1
Patient characteristics

	Elective CD n=48	SVD n=50	p value
Age (yr)	32.5 (5.1)	31.7 (5.7)	0.456
Hight (cm)	158.5 (5.7)	158.8 (5.0)	0.818
Weight (kg)	65.5 (9.0)	68.3 (15.4)	0.272
BMI (kg•m-2)	26.0 (3.1)	27.0 (5.6)	0.275
Gestational age (wk)	37.3 (0.6)	39.2 (1.8)	<0.001
Gravid	1 [1-2]	1 [1-2]	0.377
Number of fetus			<0.001
Single	37 (77.1%)	50 (100%)	
Twin	11 (22.9%)	0	
Diabetes mellitus			1
None	44 (91.7%)	44 (88%)	
Gestational diabetes	3 (6.3%)	4 (8%)	
Type 2 diabetes	1 (2.1%)	2 (4%)	
Insulin use	1 (2.1%)	3 (6.0%)	0.617
Hypertensive disorders of pregnancy			
None	47 (97.9%)	46 (92%)	0.243
Gestational hypertension	0	3 (6%)	
Preeclampsia	0	1 (2%)	
Chronic hypertension	1 (2.1%)	0	
Maternal comorbidity			
Cardiovascular	2 (4.2%)	2 (4%)	1
Neurological	1 (2.1%)	5 (10%)	0.205
Respiratory	8 (16.7%)	8 (16%)	1
Gastrointestinal	0	3 (6%)	0.243
Renal	3 (6.3%)	1 (2%)	0.357
Hematological	0	4 (8%)	0.118
Endocrine other than diabetes	5 (10.4%)	3 (6%)	0.482
Mental	2 (4.2%)	8 (16%)	0.092
ASA-PS			0.001
2	46 (95.8%)	35 (70%)	
3	2 (4.2%)	15 (30%)	

Continuous variables are expressed in average (standard deviation) or median [25-75 percentile].

CD, cesarean delivery; *SVD*, spontaneous vaginal delivery; *BMI*, body mass index; *ASA-PS*, American Society of Anesthesiologists physical status.

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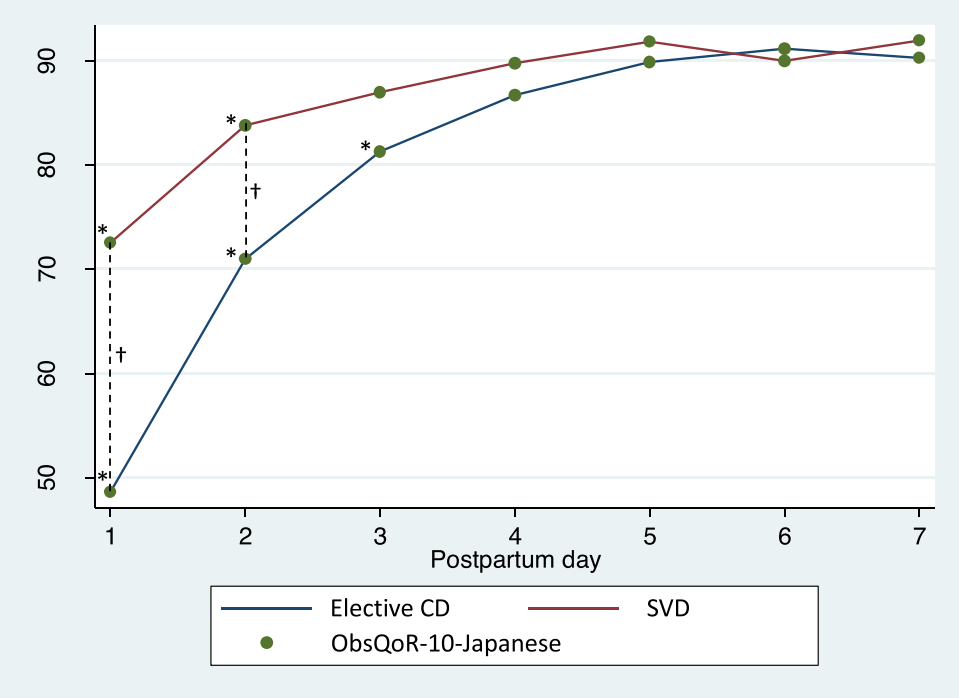
3. Test−retest reliability was very good (ICC=0.890 [95% CI, 0.762−0.942]).
4. Floor and ceiling effects were acceptable: <5% women scored either 0 or 100 (lowest or highest possible scores).

Responsiveness. As demonstrated in Figure 2, ObsQoR-10-Japanese is a responsive instrument that can detect significant differences from day 1 to day 4 in women delivering via CD and day 1 to day 3 in women delivering via SVD, and is able to differentiate between delivery modes up to day 2 postpartum.

Feasibility. There were 100 and 96 enrolled women who completed the ObsQoR-10-Japanese at 24 and 25 hours

FIGURE 2
Trends of postpartum recovery by mode of delivery



The dots represent average scores of ObsQoR-10-Japanese.

Asterisk denotes statistically significant difference was observed in subsequent days; *Dagger* denotes statistically significant difference was observed between the modes of delivery.

CD, cesarean delivery, *ObsQoR-10-Japanese*, Obstetric Quality of Recovery-10, Japanese version; *SVD*, spontaneous vaginal delivery.

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after delivery, respectively. In addition, all patients understood and answered all questions of ObsQoR-10-Japanese without any verbal guidance from the researchers.

Comments

Principal findings

The main finding from this study is that scheduled CD is associated with a longer recovery compared with SVD in nulliparous women, with recovery plateau times of 4 and 3 days after CD and SVD, respectively. In addition, the ObsQoR-10 scores were significantly higher in patients who underwent SVD than in those who underwent scheduled CD up to day 3 postpartum, after which there were no significant differences between these groups. Finally, ObsQoR-10-Japanese is a valid, reliable, and responsive measure of postpartum recovery in Japanese-speaking patients.

Results in the context of what is known

Although studies have demonstrated significant differences between delivery modes (scheduled vs emergency CD and instrumental vs SVD) at 24 hours, and between SVD and CD using recovery scores taken between 24 and 72 hours postpartum,[2–5] there is a paucity of data evaluating postpartum recovery trajectories in women beyond 24 hours or daily changes in the first week postpartum. Furthermore, data comparing recovery trajectories between delivery modes, which can be used to manage patient expectations and guide discussion and decision-making between clinicians and patients during delivery planning, have thus far been lacking. Patients can now be informed that significant differences in ObsQoR-10 scores are demonstrable between delivery modes until day 3 postpartum. This could also help inform clinicians and patients regarding optimum length of stay for patients undergoing these delivery modes. Within the United Kingdom, patients can be discharged on day 1 after CD per the National Institute for Health and Care Excellence (NICE) guideline recommendations.[9] In the United States, insurance covers patients until day 3 and 5 following uncomplicated SVD and CD, respectively.[10] Although postpartum length of stay differs among various health care systems,[11,12] the data in this study provide useful insights into recovery profiles following these delivery modes, which could help to guide clinicians and health care systems regarding optimal length of hospital stay based on quality of recovery scores. ObsQoR-10 has recently been included in a core outcome set to evaluate obstetrical enhanced recovery implementation success in future research and quality improvement efforts.[13] This study

TABLE 2
Postpartum recovery

	Elective CD n=48	SVD n=50	p value
First analgesia time from delivery (min)	333 [226.5-399.5]	596 [361-931]	<0.001
Postpartum opioid dose: intravenous morphine equivalent			
24hr (mg)	0 [0-0]	0 [0-0]*	0.003
48hr (mg)	0 [0-0]	0 [0-0]*	0.001
Anti-emetics <48hr	10 (20.8%)	0	<0.001
Anti-pruritis <48hr	6 (12.5%)	0	0.012
Max pain NRS 24hr	5.3 (1.8)	5.2 (1.9)	0.894
First fluid intake from delivery (min)	409.1 (69.3)	109.9 (96.3)	<0.001
First walk from delivery (min)	7.91 [6.24-9.71]	5.07 [4.85-5.32]	<0.001
First solid food from delivery (hr)	25.6 [23.8-25.9]	3.21 [1.93-5.08]	<0.001
Foley removed from delivery (hr)	23.8 [22.4-24.8]	16.5 [5.77-27.3]†	0.729
Discharge from delivery (day)	5.99 [5.91-6.03]	4.85 [4.74-5.13]	<0.001
ObsQoR-10-Japanese			
24hr (Day 1)	48.0 (16.3)	72.5 (17.7)	<0.001
25hr	54.3 (17.6)	76.6 (17.5)	<0.001
Day 2	70.4 (13.1)	83.8 (15.1)	<0.001
Day 3	81.3 (11.8)	87.0 (12.1)	0.021
Day 4	86.7 (8.2)	89.7 (9.7)	0.102
Day 5	89.9 (7.6)	91.8 (7.8)	0.239
Day 6	91.2 (7.0)	90 (10.0)	0.559
Day 7	90.2 (8.0)	91.9 (8.6)	0.423
EQ5D3L point at 24hr	0.46 (0.19)	0.62 (0.21)	<0.001
GHVAS at 24hr	42.6 (16.1)	56.9 (18.8)	<0.001
Any adverse event	3 (6.3%)	4 (8%)	1

Continuous variables are expressed in average (standard deviation) or median [25-75 percentile].

CD, cesarean delivery; *SVD*, spontaneous vaginal delivery; *NRS*, numerical rating scale; *ObsQoR-10-Japanese*, obstetric quality of recovery 10 Japanese version; *EQ5D3L*, EuroQual 5-dimension 3-level; *GHVAS*, global health visual analogue scale.

* No patients in SVD required postpartum opioid; † Only two patients in SVD required postpartum urinary catheter.

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demonstrates the potential applicability of this measure in an East Asian setting.

Clinical implications

Optimal timing of patient discharge is an underexplored area. Findings from this study can be used as a starting point to determine when patients *could* be discharged through assessment of ObsQoR-10 scores, patient satisfaction with discharge timing, patient experience of the discharge process, and correlation with readiness-for-discharge criteria. Although ObsQoR-10 is the best available measure of inpatient postpartum recovery,[14] it becomes less clinically relevant (and therefore begins to lack content validity) as duration from delivery increases. For example, shivering, nausea, and vomiting are usually symptoms encountered in the hours and on day 1 following delivery, and are likely to be less prevalent on day 7. Similarly, ability to hold the infant and attend to personal hygiene are much more likely to be achieved by patients at day 7 in all but the most unwell patients, who did not meet the inclusion criteria of this study. Conversely, symptoms such as sleep deprivation, mood disturbance, and fatigue may be more relevant at time points beyond 5 to 7 days,[15] but are not assessed by the ObsQoR-10 tool because it was originally developed for use in the first 24 hours postpartum.

Research implications

Other PROMs, such as the WHOQOL-BREF, Bergen Insomnia Scale,[16] Edinburgh Postnatal Depression Scale,[17] and Short-Form Brief Pain Inventory,[18] may

be useful in bridging the aforementioned gap through optimal assessment of postpartum recovery domains.[19] However, many PROMs have not been developed specifically for postpartum use, and therefore fail to assess certain aspects of postpartum recovery, including breastfeeding, breast health, individual support from others, or exhaustion related to child-rearing. Future studies are therefore needed to determine the best measure(s) for intermediate postpartum recovery, for example between day 3 and day 7 and at other postpartum time points.[20] ObsQoR-10 has now been validated in several different languages and health care settings. Comparisons of recovery between patients delivering in different health care systems could encourage quality improvement initiatives by learning from best-performing institutions and outliers. A standardized recovery measure can also highlight cultural, antenatal, and postpartum factors that significantly affect quality of recovery following specific delivery modes.

Strengths and limitations

This study assessed postpartum recovery for a week using ObsQoR-10, which has been validated by multiple studies worldwide.[2–7] Most studies using PROMs to assess postpartum recovery did so for only 2 to 3 days postpartum, which might be insufficient to detect full recovery from childbirth at the end of follow-up. Thus, our result could provide better understanding on the trends of postpartum recovery by mode of delivery. One notable finding was that there was no significant difference in pain score on the day after delivery between SVD and CD groups (Supplemental Table 3). Regarding pain control, we mainly used nonopioid medications, including regular acetaminophen (1 g, 4 times daily intravenously), to manage pain in the CD group, with intravenous 15-mg pentazocine or 0.15-mg buprenorphine 6-hourly for breakthrough pain. In the SVD group, no regular scheduled analgesics were given, and breakthrough pain was treated with the oral nonsteroidal antiinflammatory drug (NSAID), loxoprofen, in 60-mg doses, 6-hourly. However, high pain scores after vaginal birth have been linked to the development of chronic pain after delivery,[21] emphasizing the need for further interventions.

Conversely, we acknowledge that ObsQoR-10 has not been validated or modified for specific postpartum populations that may be susceptible to worse postpartum recovery, such as patients admitted to the intensive care unit and neonates requiring neonatal intensive care unit admission. This study was undertaken in a tertiary referral perinatal center, with a disproportionate number of high-risk pregnancies compared with the rest of the Japanese peripartum population. The standard length of postpartum stay in our institution is therefore longer than national averages with lower-risk pregnancies. Validity, reliability, responsiveness, and feasibility of ObsQoR-10 have now been demonstrated in multiple languages and health care settings, and for obstetrical patients undergoing various delivery modes. Most parturients only had scheduled intravenous acetaminophen for 24 hours in addition to intrathecal morphine, which is not consistent with recommended enhanced recovery after CD (ERAC) protocols,[22,23] which involve scheduled acetaminophen and NSAIDs throughout the hospital stay. Pain management after surgery has a pivotal role in prompt recovery, and our management may have negatively affected maternal recovery. However, pain management would have affected both the CD and SVD groups and thus does not explain between-group differences. Lastly, we only recruited nulliparous women because we hypothesized that parturients with previous childbirth and child-rearing experiences would have shorter hospital length of stay, which would increase attrition bias.

Conclusions

Among nulliparous women, inpatient postpartum recovery was achieved on day 4 and day 3 postpartum by those who underwent scheduled CD and SVD, respectively. There was no significant difference in quality of recovery between these delivery modes after day 3 postpartum. ObsQoR-10-Japanese is a valid, reliable, responsive, and feasible tool.

Glossary

BMI = body mass index; **CD** = cesarean delivery; **CI** = confidence interval; **EQ-5D-3L** = EuroQoL 5-Dimension 3-Level; **GHVAS** = global health visual analog score; **ICC** = intraclass correlation coefficient; **IQR** = interquartile range; **ObsQoR-10** = Obstetric Quality of Recovery-10; **ObsQoR-10-Japanese** = Obstetric Quality of Recovery-10, Japanese version; **PROM** = patient-reported outcome measure; **SD** = standard deviation; **STROBE** = Strengthening the Reporting of Observational Studies in Epidemiology; **SVD** = spontaneous vaginal delivery.

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Supplementary materials

Supplementary material associated with this article can be found in the online version at doi:10.1016/j.xagr.2023.100226.

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