Age- and Population-Adjusted Trends in Inpatient Surgical Management of Vaginal Prolapse, Rectal Prolapse, and Concurrent Vaginal and Rectal Prolapse Surgery

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Abstract

Objective To report age- and population-adjusted trends in the prevalence of inpatient vaginal prolapse (VP), rectal prolapse (RP), and concurrent VP/RP surgical procedures in women in Washington State over a 12-year period.

Methods The Comprehensive Hospital Abstract Reporting System, an inpatient claims database, was queried for female patients aged 20 years or older with a diagnosis of VP and/or RP and associated surgical procedures from 2008 to 2019. Rates for female patients were adjusted by age and population based on census results.

Results Between 2008 and 2019, inpatient admissions for concurrent VP/RP surgery remained stable, with adjusted rates ranging from 1.42 to 3.38 per 100 000, with a majority performed in patients < 80 years old. The population-adjusted rate of inpatient RP repairs remained stable at 3.12 to 5.14 per 100 000. The population-adjusted rate of inpatient VP repairs decreased dramatically, from 81.79 to 6.96 per 100 000.

Conclusions The rate of inpatient RP and combined RP/VP surgical procedures was low and remained stable, while inpatient VP surgical repairs decreased substantially. Since the dataset is limited to inpatient surgery, this trend may reflect a shift to outpatient settings for VP surgeries. Nationally in the United States, there has been a trend toward multidisciplinary surgical management of concurrent VP/RP. However, this same trend does not appear to be reflected in Washington State, suggesting that nationwide trends may not be reflective of trends within each state. Further study is needed to understand how and why local trends in the management concurrent VP/RP may differ from national trends, and potentially improve concurrent VP/RP management using multidisciplinary approaches.

Introduction

Vaginal (VP) and rectal prolapse (RP) in women share a common pathophysiology and similar surgical approaches. The incidence of concomitant uterine/VP with RP is variable and has been reported to be ~38% in some analyses[1].

Key Words

Concurrent surgery, rectal prolapse, vaginal prolapse, multidisciplinary care

Competing Interests

None declared.

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Abbreviations

CHARS Comprehensive Hospital Abstract Reporting System
ICD International Classification of Diseases
IRB Institutional Review Board
RP rectal prolapse
VP vaginal prolapse

Both VP and RP occur more commonly in women over the age of 65 years[2,3], and traditionally have been treated as separate entities. However, there has been a trend toward a multidisciplinary approach, with concomitant procedures being performed by colorectal surgeons and urologists or gynecologists[1,4,5]. Multidisciplinary approaches have been demonstrated to be safe and efficacious[1] and may improve surgical outcomes and patient symptoms[4,6–9]. Prior work has demonstrated that the national rate of multidisciplinary repair in women diagnosed with VP and RP increased from 0.7% in 2003 to 1.9% in 2017[5]. However, a more detailed analysis of these trends on a statewide level has not been reported. The objective of this study is to report age- and population-adjusted trends in the prevalence of inpatient VP, RP, and concurrent VP/RP surgical procedures in women in Washington State over a contemporary 12-year period.

Materials and Methods

The Comprehensive Hospital Abstract Reporting System (CHARS), a Washington State administrative inpatient claims database that captures all inpatient hospitalizations from all hospitals in the state, and includes data such as age, sex, zip code, diagnosis and procedure codes, billing codes, and procedure dates, regardless of insurance type, was queried for female patients 20 years of age or older with both a diagnosis of VP and/or RP and associated VP and/or RP surgical procedures from 2008 to 2019. The CHARS data dictionary is publicly available at https://www.doh.wa.gov/ and includes diagnosis and procedural codes based on the Ninth revision of the International Classification of Diseases (ICD-9) and ICD-10 for admissions. The CHARS database does not utilize Current Procedural Terminology (CPT®) codes. Using the International Classification of Diseases Ninth and Tenth edition (ICD-9 and ICD-10) codes, women ≥ 20 years of age with VP and/or RP diagnosis codes were identified (**Appendix 1**). ICD procedural codes for VP and RP operations were used to identify patients who had undergone treatment for prolapse (**Appendix 1**). Surgical procedures that were performed on the same date were considered concurrent, while those with different dates were considered staged. Demographic characteristics and rates of concurrent surgical repair were analyzed. Rates were adjusted by age, and population of women, based on Washington State Census results for 2008 to 2019 using the direct method. The study was submitted for Institutional Review Board (IRB) review and was found to not constitute human subjects research and did not require IRB approval.

Results

Query of the CHARS database identified 17 840 female inpatient admissions with a diagnosis of VP and/or RP who had also undergone a VP and/or RP procedure. Of those, 15 279 (85.6%) underwent VP-only and 918 (5.1%) underwent combined VP/RP repair. The majority of women identified in our query were < 80 years old, 52.03% were identified as white, and 4.83% of the population were identified as minority groups (**Table 1**). Notably, there was no information provided on ethnicity in the database for 43.14% of the population.

Seventy-five percent of all VP-only, RP-only, or concurrent VP/RP inpatient surgeries were performed in the 7 most populated Washington State counties. The majority of all combined VP/RP procedures were performed in 10 facilities in a single county (King County, which includes the Seattle metropolitan area). The majority of patients identified in the query were residents of 5 counties (**Table 2**), and 75% of patients lived within 20 miles of their treating facilities. Among the top 15 centers performing VP and/or RP prolapse surgery, 2 centers were noted to have patient populations composed of nearly 95% of patients who resided less than 20 miles away (**Figure 1**).

Between 2008 and 2019, inpatient admissions for concurrent VP/RP surgery remained stable, with adjusted rates ranging from 1.42 to 3.38 per 100 000 women (**Figure 2**), and 95% of combined procedures were performed in patients < 80 years old. The adjusted rate of inpatient RP-only repairs also remained stable, 3.12 to 5.14 per 100 000 women, with 82% being performed in women < 80 years old. The adjusted rate of inpatient VP-only repairs decreased markedly, from 81.79 per 100 000 women in 2008 to 6.96 per 100 000 women in 2019, with 94% of these surgeries being performed in women < 80 years old.

Discussion

Prior work has demonstrated that there has been a nationwide trend of increasing utilization of multidisciplinary approaches toward treating VP/RP concurrently, increasing from 0.7% of all surgeries performed for rectal prolapse or pelvic organ prolapse in 2003 to 1.9% in 2017[5]. However, the same trend for concurrent VP/RP surgery has not been clearly identified in Washington State. These data suggest that despite a nationwide trend toward multidisciplinary

TABLE 1.

Demographics by prolapse type for female inpatient admissions 2008–2019 in Washington State

	Prolapse type							
	Total prolapse n = 17 840		Vaginal and rectal combination n = 918		Vaginal only n = 15 279		Rectal only n = 1643	
	n	%	n	%	n	%	n	%
Age group								
< 50 years	4078	22.86	266	28.98	3485	22.81	327	19.90
50–64 years	6421	35.99	355	38.67	5557	36.37	509	30.98
65–79 years	6025	33.77	250	27.23	5270	34.49	505	30.74
80+ years	1316	7.38	47	5.12	967	6.33	302	18.38
Ethnicity*								
American Indian/Alaskan Native	78	0.44	2	0.22	62	0.41	14	0.85
Asian	209	1.17	15	1.63	167	1.09	27	1.64
Black/African American	98	0.55	7	0.76	78	0.51	13	0.79
Hispanic origin	435	2.44	13	1.42	395	2.59	27	1.64
Native Hawaiian/Pacific Islander	40	0.22	0	0.00	36	0.24	4	0.24
White	9283	52.03	582	63.40	7561	49.49	1140	69.39
Excluded/Not provided	7697	43.14	299	32.57	6980	45.68	418	25.44

**All ethnicity categories/labels taken directly from the Comprehensive Hospital Abstract Reporting System database.*

approaches, this trend may not be occurring at similar rates in each state. Additionally, the previously reported rates[5] were not adjusted for population, age, or gender, which may affect the ability to compare the results. Although there was a significant nationwide increase in the number of concurrent VP/RP procedures, whether this increase is due to a growing and aging population with a higher incidence for pelvic organ prolapse has not been well studied.

The procedure rates described herein were obtained using the CHARS database, which collects record-level information on inpatient and observation-patient community hospital stays. While limited to administrative data, this database has the advantage of capturing all procedures performed provided that the patient was hospitalized, regardless of insurance status. We acknowledge the limitations of using this inpatient statewide database. However, the information captured adds to our knowledge of trends in the utilization of concurrent RP/VP surgery overall. Although some studies with small patient cohorts have suggested that rectal prolapse procedures such as laparoscopic rectopexy may be feasibly performed as outpatient procedures[10–13], the majority of RP surgeries are performed as inpatient procedures and concurrent VP/RP surgeries are therefore captured in this dataset, allowing for analysis of trends in this procedure. However, VP surgery can be performed either in an inpatient or outpatient setting, depending on many factors. The reporting of only inpatient VP surgeries is a limitation that prevents an accurate analysis of broader trends in VP and its procedures. We acknowledge this limitation as it relates to the capture of all vaginal prolapse surgeries. The focus of this study is concurrent VP/RP surgery, which is captured in this dataset.

Between 2008 and 2019, the rate of inpatient VP surgery decreased substantially in Washington State from 81.79 per 100 000 women in 2008 to 6.96 per 100 000 women in 2019. Previously published literature has demonstrated an increasing utilization of outpatient urologic procedures[14], suggesting that this trend could represent an increase in utilization of outpatient VP surgeries or a true decrease in VP surgery over time. The shift of surgery from inpatient to outpatient possi-

TABLE 2.

Female inpatient admissions for top 15 facility counties and residential counties by prolapse type

Facility county of care										
Total prolapse (n = 17 840)			Combination vaginal and rectal prolapse (n = 918)			Vaginal only (n = 15 278)			Rectal only (n = 1643)		
County (n*)	Ads.	%	County (n*)	Ads.	%	County (n*)	Ads.	%	County (n*)	Ads.	%
King (17)	6136	34.39	King (10)	808	88.02	King (17)	4487	29.37	King (12)	841	51.19
Spokane (4)	1965	11.01	Spokane (4)	53	5.77	Spokane (4)	1656	10.84	Spokane (4)	256	15.58
Pierce (5)	1590	8.91	Pierce (4)	35	3.81	Pierce (5)	1381	9.04	Pierce (5)	174	10.59
Snohomish (4)	1290	7.23	Snohomish (2)	9	0.98	Snohomish (4)	1211	7.93	Snohomish (3)	70	4.26
Benton (3)	887	4.97	Benton (1)	6	0.65	Benton (3)	815	5.33	Benton (3)	66	4.02
Yakima (4)	761	4.27	Kitsap (1)	4	0.44	Yakima (4)	755	4.94	Thurston (2)	54	3.29
Clark (2)	759	4.25	Chelan (1)	1	0.11	Clark (2)	747	4.89	Kitsap (1)	41	2.50
Whatcom (1)	538	3.02	Clark (1)	1	0.11	Whatcom (1)	516	3.38	Chelan (1)	29	1.77
Kitsap (1)	482	2.70	Thurston (1)	1	0.11	Kitsap (1)	437	2.86	Skagit (2)	28	1.70
Cowlitz (1)	414	2.32				Cowlitz (1)	402	2.63	Whatcom (1)	22	1.34
Thurston (2)	399	2.24				Clallam (1)	370	2.42	Cowlitz (1)	12	0.73
Clallam (1)	380	2.13				Thurston (2)	344	2.25	Clark (2)	11	0.67
Skagit (3)	361	2.02				Walla Walla (2)	339	2.22	Clallam (1)	10	0.61
Walla Walla (2)	342	1.92				Skagit (3)	333	2.18	Whitman (2)	8	0.49
Grays Harbor (1)	302	1.69				Greys Harbor (1)	301	1.97	Jefferson (1)	7	0.43
Patient residential county										
Total prolapse (n = 17840)			Combination vaginal and rectal prolapse (n = 918)			Vaginal only (n = 15 278)			Rectal only (n = 1643)		
County	Ads.	%	County	Ads.	%	County	Ads.	%	County	Ads.	%
King	6136	34.39	King	356	38.78	King	2919	19.10	King	841	51.19
Spokane	1965	11.01	Snohomish	311	33.88	Snohomish	1762	11.53	Spokane	256	15.58
Pierce	1590	8.91	Spokane	30	3.27	Pierce	1322	8.65	Pierce	174	10.59
Snohomish	1290	7.23	Pierce	28	3.05	Spokane	1265	8.28	Snohomish	70	4.26
Benton	887	4.97	Kitsap	23	2.51	Yakima	794	5.20	Benton	66	4.02
Yakima	761	4.27	Thurston	19	2.07	Clark	656	4.29	Thurston	54	3.29
Clark	759	4.25	Island	15	1.63	Benton	653	4.27	Kitsap	41	2.50
Whatcom	538	3.02	Skagit	14	1.53	Whatcom	603	3.95	Chelan	29	1.77
Kitsap	482	2.70	Whatcom	13	1.42	Kitsap	589	3.85	Skagit	28	1.70
Cowlitz	414	2.32	Clallam	11	1.20	Clallam	432	2.83	Whatcom	22	1.34
Thurston	399	2.24	Yakima	11	1.20	Thurston	397	2.60	Cowlitz	12	0.73
Clallam	380	2.13	Benton	9	0.98	Cowlitz	363	2.38	Clark	11	0.67
Skagit	361	2.02	Mason	6	0.65	Grays Harbor	330	2.16	Clallam	10	0.61
Walla Walla	342	1.92	Kittitas	5	0.54	Skagit	279	1.83	Whitman	8	0.49
Grays Harbor	302	1.69	Kootenai (Idaho)	5	0.54	Franklin	228	1.49	Jefferson	7	0.43

*Note: Percentages calculated out of total prolapse type sample. *Denotes number of facilities within that county. Ads.: Admissions.*

FIGURE 1.

Proportion of patients receiving care locally (within 20 miles) at top 15 Washington State facilities from 2008 to 2019 by average annual volume of vaginal prolapse, rectal prolapse, or concurrent vaginal and rectal prolapse surgeries. Centers sorted in descending order of average number of prolapse procedures per year for each center.

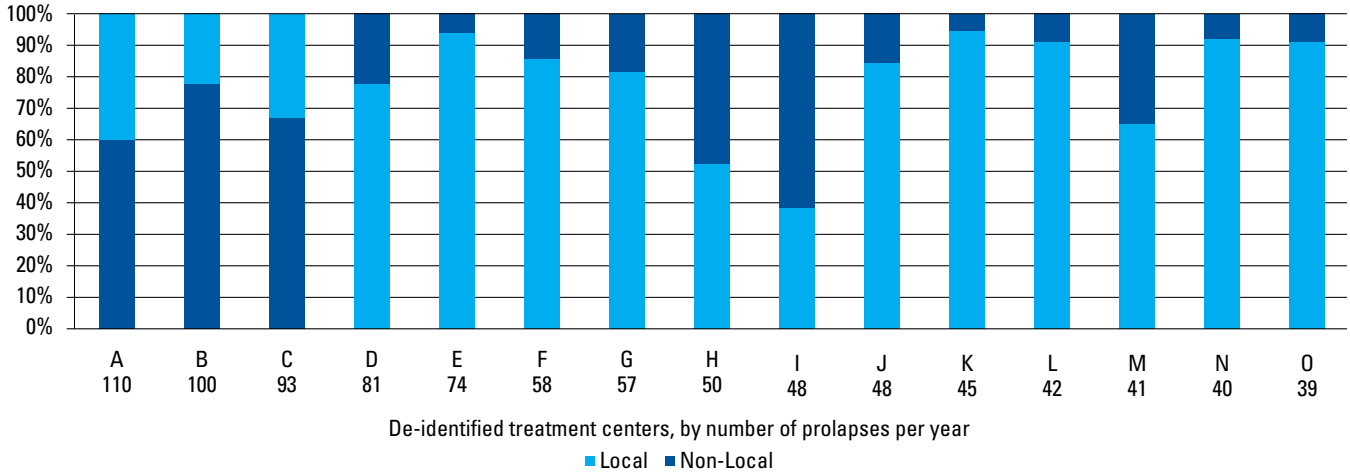
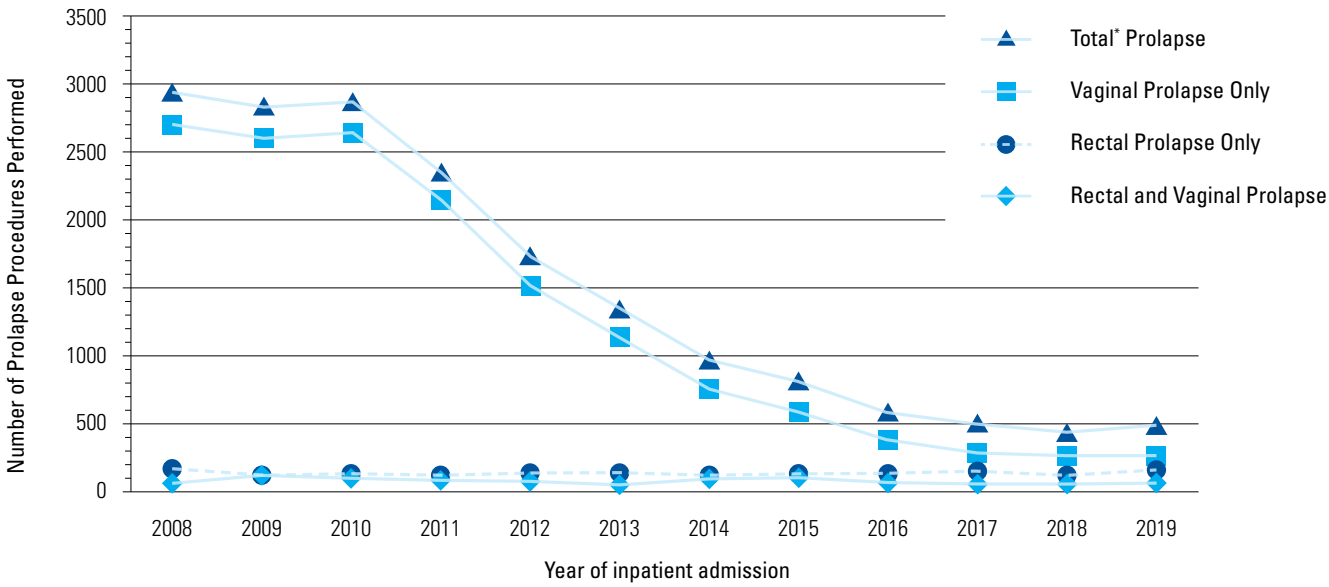


FIGURE 2.

Female inpatient prolapse procedures by prolapse type for Washington State from 2008 to 2019. Total prolapse is combined total of vaginal, rectal, and concurrent vaginal and rectal prolapse surgeries.



bly reflects the US health care system's shift toward more cost-effective outpatient settings and insurance reimbursement patterns[15].

The prevalence of VP has been found to vary across racial groups[16,17], and racial disparities have been identified in women undergoing pelvic organ prolapse surgery[18]. For this reason, we were interested in evaluating the trends in multidisciplinary approaches in treating prolapse across racial groups. Low rates of VP and/or RP surgery have been noted in minority groups[16,17]. However, this observation could not be clearly assessed using the CHARS database, as racial information was not provided for 43.14% of the patient population.

The majority of all inpatient VP-only, RP-only, and concurrent VP/RP surgeries were performed in the most populated counties in Washington State, and the majority of patients lived within a 20-mile radius of their treating facilities. Indeed, in 2 facilities, the patient population was nearly entirely composed of patients who resided less than 20 miles away (**Figure 1**). It should also be noted that the distances described here are straight-line distances and may not be an accurate reflection of the time or actual distance required to travel to treatment centers, particularly in Washington State, where patients may need to utilize ferry services in order to reach the more densely populated regions where high-

er-volume facilities are located. Patients electing surgical management are more likely to travel farther, as do patients travelling from areas with fewer women and older people[19,20]. Distance travelled to reach care may be a barrier to patient care, and longer distances travelled have been associated with later presentation to care, and greater likelihood of planning surgery at presentation[19]. There may be a multitude of reasons for this, including patients electing treatments that require fewer follow-ups due to the long distances required for follow-up, lack of available services in less-populated counties, or patients who have failed conservative therapies at facilities closer to their homes. Overall, our study showed that VP and/or RP surgical care was concentrated in the most populated areas of Washington State.

Additional limitations of this database include the lack of recorded clinical variables, including outcomes, complications, recurrence, and patient-specific variables such as degree of prolapse or comorbid diseases. These results may not be generalizable, as the data are specific to Washington State. Strengths of the analysis include the ability to adjust surgery rates by gender, state population, and age. In addition, all patients undergoing inpatient VP-only, RP-only, and concurrent VP/RP procedures in Washington State are included, and not limited by insurance status.

National trends have shown an increase in utilization of concurrent VP/RP surgery. To assess this trend on a more local level, these procedures were examined in Washington State over a 12-year time period and were found to have remained stable. The reasons for this cannot be clearly identified using the CHARS database. Future directions may include investigations into contributing factors that may play a role in increasing awareness of the prevalence of concurrent VP and RP as well as supporting integrated and collaborative treatment for women with concurrent VP and RP.

Conclusion

The rates of inpatient RP and combined VP/RP surgical procedures between 2008 and 2019 were low and remained stable in Washington State. Inpatient VP surgical repairs decreased from 81 to 6 per 100 000 women over the same time period, which may represent an increase in outpatient VP procedures. Although previously published data suggest that a multidisciplinary approach to VP and RP is increasing nationwide, the trend seen here does not seem to reflect the same increase, suggesting that nationwide trends may not be reflective of local trends within each state. Further study is needed to understand how and why local trends in the management concurrent VP/RP may differ from national trends, and potentially improve concurrent VP/RP management using multidisciplinary approaches.

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Ethics Statement

The Institutional Review Board of Benaroya Research Institute at Virginia Mason determined that this study did not constitute human subjects research and thus this study did not require IRB approval.

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