

## SECTION 3 INPATIENT HOSPITAL STAYS BY PROCEDURE

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### HIGHLIGHTS

- The number of discharges with procedures increased from 21.3 million in 1997 to 25.1 million in 2008, an 18-percent increase.
- Blood transfusion occurred in over ten percent of all hospital stays that included a procedure and was the most frequently performed procedure in 2008.
- Episiotomy fell from the list of top procedures, dropping in rank from eighth in 1997 to thirty-first in 2008, a 60-percent decrease.
- C-section was the most frequent major operating room procedure—performed on 1.4 million women in 2008, up from 800,000 in 1997. PTCA—a procedure involving the use of a balloon-tipped catheter to enlarge a narrowed artery—grew 56 percent from 1997 to 2006. Between 2006 and 2008, however, there was a 17-percent decline in discharges with this procedure.
- Discharges with coronary artery bypass graft (CABG) procedures declined 38 percent between 1997 and 2008.
- Respiratory intubation and mechanical ventilation grew rapidly from 1997 to 2008 among 45-64 year olds (123 percent), 65-84 year olds (45 percent), and seniors 85 years and older (89 percent).
- Although hysterectomies and oophorectomies increased during the 5-year period from 1997-2002, these female-specific procedures declined in subsequent years. Over the 1997 to 2008 period, hysterectomies decreased by 13 percent and oophorectomies by 21 percent.

## EXHIBIT 3.1 Most Frequent All-listed Procedures

### Number, Percent Distribution, Rank, and Growth of Discharges for the Most Frequent All-listed Inpatient Hospital Procedures, 1997 and 2008

ALL-LISTED CCS PROCEDURES	NUMBER OF DISCHARGES WITH THE PROCEDURE IN THOUSANDS		PERCENT OF DISCHARGES WITH THE PROCEDURE		RANK		CUMULATIVE GROWTH 1997-2008
	1997	2008	1997	2008	1997	2008	
All discharges (with and without procedures)	34,679	39,885					15%
All discharges with any procedure	21,257	25,118	100.0%	100.0%			18
Percent of all discharges with a procedure	61%	63%					
Discharges with maternal and newborn procedures							
Prophylactic vaccinations and inoculations	567	1,619	3.0	6.4	14	2	186
Cesarean section	800	1,378	4.0	5.5	9	5	72
Repair of obstetric laceration	1,137	1,371	5.0	5.5	3	6	21
Circumcision	1,164	1,231‡	5.0	4.9	2	8	6
Artificial rupture of membranes to assist delivery	747	1,000‡	4.0	4.0	10	9	34
Fetal monitoring	1,002	957‡	5.0	3.8	6	10	-4
Episiotomy	866	348	4.0	1.4	8	31	-60
Discharges with all other procedures							
Blood transfusion	1,097	2,725	5.0	10.8	5	1	148
Diagnostic cardiac catheterization, coronary arteriography	1,461	1,521‡	7.0	6.1	1	3	4
Respiratory intubation and mechanical ventilation	919	1,444	4.0	5.8	7	4	57
Upper gastrointestinal endoscopy	1,105	1,256	5.0	5.0	4	7	14
Echocardiogram	632	839	3.0	3.3	11	11	33
Hemodialysis	473	794	2.2	3.2	17	12	68
Percutaneous transluminal coronary angioplasty (PTCA)	581	758	2.7	3.0	13	13	30
Arthroplasty knee	329	687	1.5	2.7	32	14	109
Colonoscopy and biopsy	531	587	2.5	2.3	16	15	10

‡ 2008 discharges are not statistically different from 1997 discharges at  $p < 0.05$ .

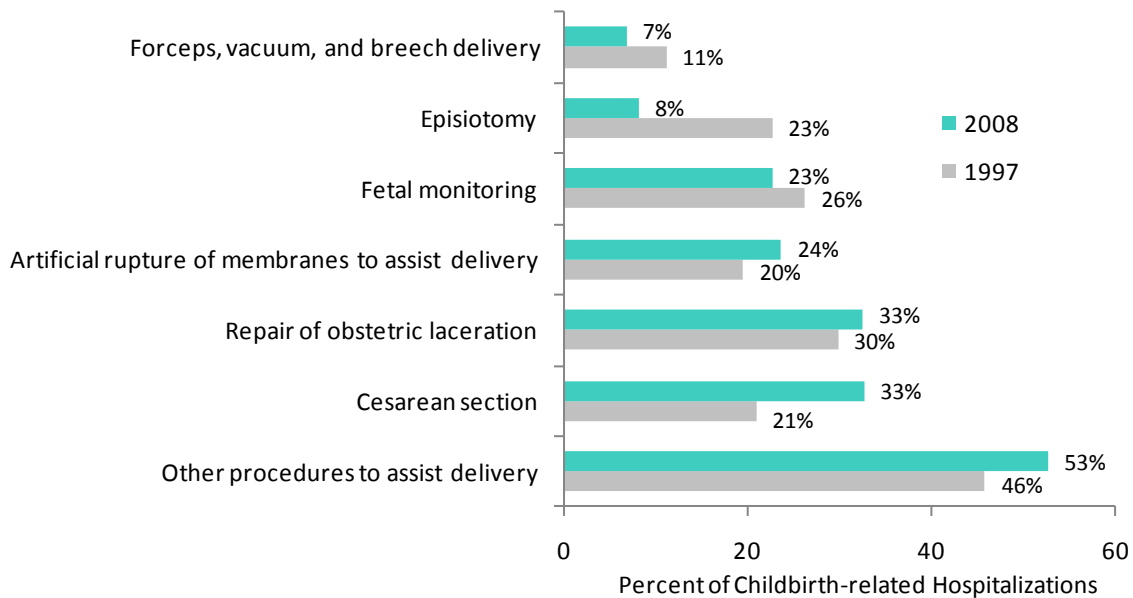
Source: AHRQ, Center for Delivery, Organization, and Markets, Healthcare Cost and Utilization Project, Nationwide Inpatient Sample, 1997 and 2008.

At least one procedure was performed during almost two out of every three hospital stays in 2008 and often more than one procedure was performed. The number of discharges with procedures increased from 21.3 million in 1997 to 25.1 million in 2008, an 18-percent increase.

- Blood transfusion occurred in over ten percent of all hospital stays that included a procedure and was the most frequently performed procedure in 2008.
- While many of the fifteen most common procedures in 2008 were also frequently performed in 1997, there were some notable exceptions:
  - Vaccinations rose in rank from fourteenth in 1997 to second in 2008. These vaccinations were overwhelmingly hepatitis B immunizations for liveborn infants.
  - Episiotomy, a surgical incision to prevent traumatic tearing during vaginal delivery, fell from the list of top procedures, dropping in rank from eighth in 1997 to thirty-first in 2008, a 60-percent decrease.

- Discharges with arthroplasty of the knee procedures more than doubled from 329,000 in 1997 to 687,000 in 2008. Arthroplasty of the knee was the fourteenth most common inpatient procedure in 2008.
- Hemodialysis and colonoscopy/biopsy also rose in frequency to rank in the top 15 procedures performed in hospitals in 2008.
- C-section was the most frequent major operating room procedure—performed on 1.4 million women in 2008.

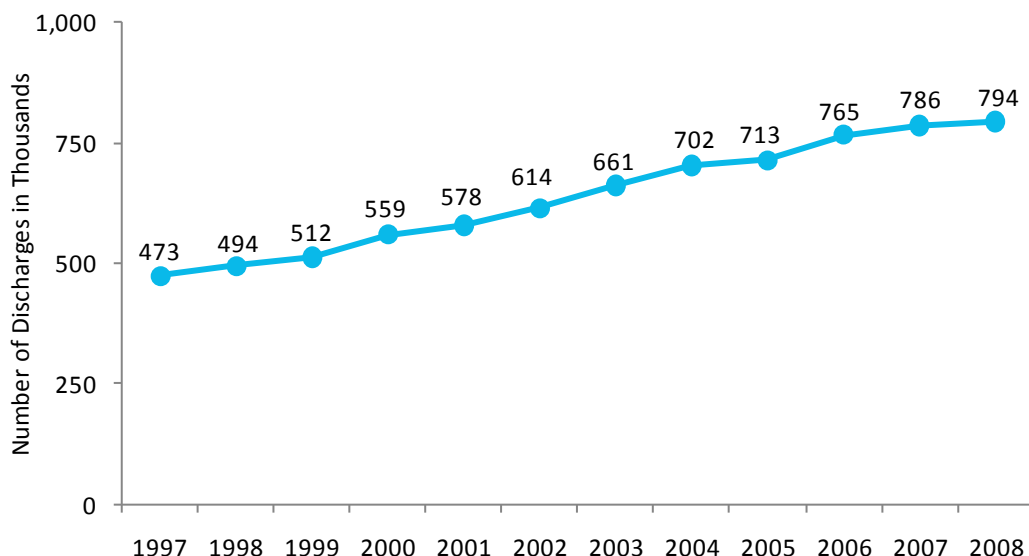
### Percent of Childbirth-related Hospitalizations with Childbirth Procedures, 1997 and 2008



Source: AHRQ, Center for Delivery, Organization, and Markets, Healthcare Cost and Utilization Project, Nationwide Inpatient Sample, 1997 and 2008.

- Only 8 percent of childbirth-related hospitalizations involved episiotomy procedures in 2008, down from 23 percent in 1997.
- Repair of obstetric laceration and C-section were each performed in one-third of childbirth-related hospitalizations in 2008.
- Artificial rupture of membranes to assist delivery was performed in 24 percent of all childbirths (up from 20 percent in 1997) and fetal monitoring was performed in 23 percent of all childbirths (compared with 26 percent in 1997).
- More than half (53 percent) of childbirth-related hospitalizations involved other procedures to assist delivery in 2008, up from 46 percent in 1997.

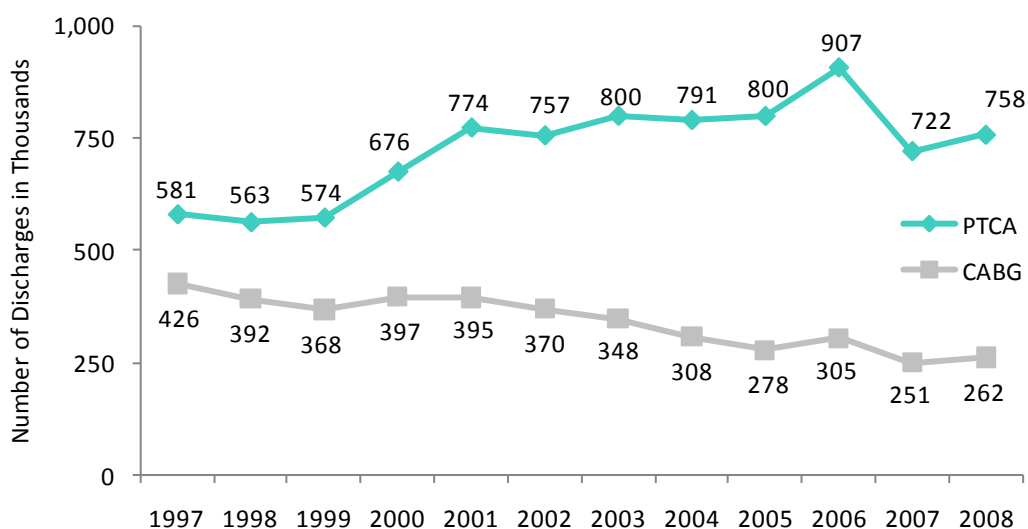
### Number of Stays with All-Listed Hemodialysis, 1997-2008



Source: AHRQ, Center for Delivery, Organization, and Markets, Healthcare Cost and Utilization Project, Nationwide Inpatient Sample, 1997-2008.

- Discharges with hemodialysis grew 68 percent between 1997 and 2008. There were 473,000 stays for this procedure in 1997 and 794,000 in 2008.

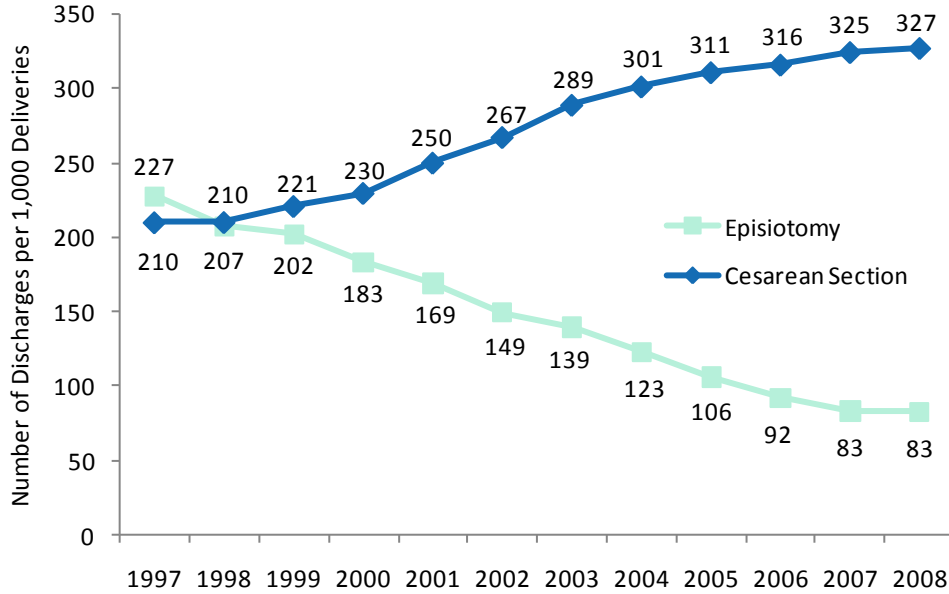
### Number of Stays with All-Listed Percutaneous Transluminal Coronary Angioplasty (PTCA) or Coronary Artery Bypass Graft (CABG), 1997-2008



Source: AHRQ, Center for Delivery, Organization, and Markets, Healthcare Cost and Utilization Project, Nationwide Inpatient Sample, 1997-2008.

- PTCA—a procedure involving the use of a balloon-tipped catheter to enlarge a narrowed artery—grew 56 percent from 1997 to 2006. Between 2006 and 2008, however, there was a 17-percent decline in discharges with this procedure.
- Discharges with coronary artery bypass graft (CABG) procedures declined 38 percent between 1997 and 2008. There were 426,000 stays for this procedure in 1997 and 262,000 in 2008.

**Discharges per 1,000 Deliveries with All-Listed Episiotomy or Cesarean Section Procedures, 1997-2008**



Source: AHRQ, Center for Delivery, Organization, and Markets, Healthcare Cost and Utilization Project, Nationwide Inpatient Sample, 1997-2008.

- In 1997 there were 227 episiotomy procedures performed per 1,000 deliveries. By 2008, this procedure was performed during only 83 per 1,000 deliveries —a decline of 64 percent.
- The rate of C-sections increased by 56 percent between 1997 and 2008. There were 210 C-sections performed per 1,000 deliveries in 1997 and 327 per 1,000 deliveries in 2008.

## EXHIBIT 3.2 Most Frequent All-listed Procedures by Age

### Number of Discharges, Percent Distribution, and Growth for the Most Frequent All-listed Inpatient Hospital Procedures by Age Group, 1997 and 2008

AGE GROUP AND ALL-LISTED CCS PROCEDURES	NUMBER OF DISCHARGES IN THOUSANDS		PERCENT OF AGE-SPECIFIC TOTAL DISCHARGES		CUMULATIVE GROWTH
	1997	2008	1997	2008	1997-2008
All ages, total discharges <sup>†</sup>	34,679	39,885			15%
<b>&lt; 1 year, total discharges</b>	<b>4,426</b>	<b>4,775</b>	<b>100.0%</b>	<b>100.0%</b>	<b>8</b>
Prophylactic vaccinations and inoculations	549	1,397	12.4	29.3	155
Circumcision	1,159	1,226	26.2	25.7	6
Respiratory intubation and mechanical ventilation	163	173	3.7	3.6	6
Enteral and parenteral nutrition	39	115	0.9	2.4	196
Diagnostic spinal tap	147	84	12.7	1.8	-43
<b>1-17 years, total discharges</b>	<b>1,821</b>	<b>1,574</b>	<b>100.0</b>	<b>100.0</b>	<b>-14</b>
Appendectomy	74	78	4.1	4.9	5
Repair of obstetric laceration	58	53	3.2	3.4	-9
Blood transfusion	26	52	1.4	3.3	100
Cancer chemotherapy	43	41	2.4	2.6	-6
Artificial rupture of membranes to assist delivery	40	34	2.2	2.2	-15
<b>18-44 years, total discharges</b>	<b>9,444</b>	<b>10,354</b>	<b>100.0</b>	<b>100.0</b>	<b>6</b>
Cesarean section	773	1,343	8.2	13.4	74
Repair of obstetric laceration	1,079	1,315	11.4	13.1	22
Artificial rupture of membranes to assist delivery	706	964	10.1	9.6	36
Fetal monitoring	952	925	7.5	9.2	-3
Episiotomy	813	329	8.6	3.3	-60

(continued on next page)

**Number of Discharges, Percent Distribution, and Growth for the Most Frequent All-listed Inpatient Hospital Procedures by Age Group, 1997 and 2008--continued**

AGE GROUP AND ALL-LISTED CCS PROCEDURES	NUMBER OF DISCHARGES IN THOUSANDS		PERCENT OF AGE-SPECIFIC TOTAL DISCHARGES		CUMULATIVE GROWTH
	1997	2008	1997	2008	1997-2008
<b>45-64 years, total discharges</b>	<b>6,496</b>	<b>9,504</b>	<b>100.0%</b>	<b>100.0%</b>	<b>46%</b>
Blood transfusion	247	741	3.8	7.8	200
Diagnostic cardiac catheterization, coronary arteriography	578	655‡	8.9	6.9	13
Respiratory intubation and mechanical ventilation	186	415	2.9	4.4	123
Upper gastrointestinal endoscopy	275	392	4.2	4.1	42
Percutaneous transluminal coronary angioplasty (PTCA)	247	335	3.8	3.5	36
<b>65-84 years, total discharges</b>	<b>10,121</b>	<b>10,761‡</b>	<b>100.0</b>	<b>100.0</b>	<b>6</b>
Blood transfusion	514	1,205	5.1	11.2	134
Diagnostic cardiac catheterization, coronary arteriography	738	686‡	7.3	6.4	-7
Respiratory intubation and mechanical ventilation	366	532	3.6	4.9	45
Upper gastrointestinal endoscopy	530	508‡	5.2	4.7	-4
Echocardiogram	306	371‡	2.8	3.4	21
<b>85+ years, total discharges</b>	<b>2,362</b>	<b>3,196</b>	<b>100.0</b>	<b>100.0</b>	<b>35</b>
Blood transfusion	138	373	5.8	11.7	170
Upper gastrointestinal endoscopy	122	143	5.2	4.5	17
Respiratory intubation and mechanical ventilation	65	123	2.8	3.8	89
Echocardiogram	65	96	2.7	3.0	49
Treatment, fracture or dislocation of hip and femur	87	89‡	3.7	2.8	2

† Includes a small number of discharges (50,000 or 0.1 percent) with missing age.

‡ 2008 discharges are not statistically different from 1997 discharges at p<0.05.

Source: AHRQ, Center for Delivery, Organization, and Markets, Healthcare Cost and Utilization Project, Nationwide Inpatient Sample, 1997 and 2008.

While some of the most frequent procedures varied by age group, some were common across several age groups.

- Blood transfusion was a top five procedure in all age groups except infants less than 1 year and individuals 18-44 years old. It was the third most common procedure for 1-17 year olds and the first for adults 45-64, 65-84, and 85 years and older. Blood transfusion was one of the fastest growing procedures from 1997 to 2008.
- Respiratory intubation and mechanical ventilation was common among four age groups (infants, adults 45-64, 65-84 years old, and 85 years and older) and represented 4 to 5 percent of discharges in each age group.
  - Respiratory intubation and mechanical ventilation grew rapidly from 1997 to 2008 among 45-64 year olds (123 percent), 65-84 year olds (45 percent), and seniors 85 years and older (89 percent).
- Upper gastrointestinal endoscopy was common among 45-64 year olds and both senior age groups (65-84 and 85 years and older). From 1997 to 2008, the number of discharges grew for 45-64 year olds (42 percent) and patients 85 years and older (17 percent). For 65-84 year olds, however, the number of discharges remained fairly stable (4-percent decline).
- Diagnostic cardiac catheterization and coronary arteriography was common for 45-64 year olds (655,000 procedures) and 65-84 year olds (686,000 procedures), but the number of procedures grew negligibly.

- Echocardiogram was the fifth most frequent procedure for patients 65-84 years (371,000 stays) and the fourth most frequent procedure for patients 85 years and older (96,000 stays)

For infants:

- The most common procedures performed on infants were routine procedures, such as vaccinations (performed in 29.3 percent of infant stays) and circumcision (performed in 25.7 percent of infant stays).
  - In 2008, 1.2 million circumcisions were completed in the hospital (56 percent of male liveborn infants).
- Procedures on infants also included those done for complex conditions affecting severely ill babies, such as respiratory intubation and mechanical ventilation (performed during 173,000 infant stays in 2008), enteral/parenteral nutrition (performed during 115,000 infant stays in 2008), and diagnostic spinal tap (performed during 84,000 infant stays in 2008).
  - Enteral and parenteral nutrition, or tube feeding, during infant hospitalizations increased 196 percent whereas spinal tap procedures decreased 43 percent, compared with an 8-percent growth in all infant discharges from 1997 to 2008.

For children 1-17:

- Appendectomy was the most common procedure for 1-17 year olds, accounting for 4.9 percent of hospitalizations in this age group.
- Other top procedures common in stays for children included repair of obstetric laceration in teen deliveries, cancer chemotherapy, and artificial rupture of membranes to assist in teen delivery.

For adults 18-44:

- All five of the most common procedures were related to pregnancy and childbirth for adults 18-44 years old.
  - C-sections and repair of obstetric laceration were the most frequently performed procedures each occurring in over 13 percent of all discharges in 2008.
  - C-sections increased by 74 percent from 1997 to 2008.
  - Episiotomy was the fifth most frequently occurring procedure in this age group, but decreased by 60 percent between 1997 and 2008.
  - Artificial rupture of membranes to assist delivery also experienced rapid growth from 1997 to 2008 (up 36 percent), while fetal monitoring procedures declined slightly (down 3 percent).

For adults 45-64 and 65-84:

- In 2008, the top four most frequently performed procedures were the same for individuals 45-64 and 65-84 years old: blood transfusion, diagnostic cardiac catheterization and coronary arteriography, respiratory intubation and mechanical ventilation, and upper gastrointestinal endoscopy.
  - Blood transfusion was the leading procedure for 45-64 year olds and 65-84 year olds.
  - Diagnostic cardiac catheterization and coronary arteriography was the second most common procedure performed in each of these age groups.

For adults 85 years and older:

- For patients 85 years and older, treatment of a fracture or dislocation of the hip and femur was a top procedure performed during a hospital stay and appeared only in this age group.
  - Discharges for treatment of a hip fracture or dislocation changed very little (2 percent) from 1997 to 2008, accounting for 89,000 stays in 2008.
- Twelve percent of all hospital stays for this age group involved a blood transfusion.



## EXHIBIT 3.3 Most Frequent All-listed Procedures by Gender

**Number of Discharges, Percent Distribution, and Rank of the Most Frequent All-listed Procedures for Inpatient Hospital Stays Excluding Pregnancy and Childbirth, by Gender, 2008**

ALL-LISTED CCS PROCEDURES	NUMBER OF DISCHARGES IN THOUSANDS		PERCENT OF DISCHARGES WITH A PROCEDURE		RANK	
	MALES	FEMALES	MALES	FEMALES	MALES	FEMALES
Discharges with a procedure†	8,565	9,451	100.0%	100.0%		
Blood transfusion	1,177	1,545	13.7	16.4	1	1
Diagnostic cardiac catheterization, coronary arteriography	923	598	10.8	6.3	2	4
Respiratory intubation and mechanical ventilation	768	676	9.0	7.2	3	3
Upper gastrointestinal endoscopy	568	687	6.6	7.3	4	2
Percutaneous transluminal coronary angioplasty (PTCA)	501	256	5.9	2.7	5	16
Echocardiogram	439	400‡	5.1	4.2	6	7
Hemodialysis	414	379‡	4.8	4.0	7	8
Enteral and parenteral nutrition	284	282‡	3.3	3.0	8	13
Arthroplasty knee	259	426	3.0	4.5	9	6
Alcohol and drug rehabilitation/detoxification	257	120	3.0	1.3	10	36
Colonoscopy and biopsy	244	342	2.8	3.6	13	10
Hysterectomy	–	511	–	5.4	–	5
Oophorectomy, unilateral and bilateral	–	374	–	4.0	–	9

† Excludes procedures related to pregnancy and childbirth and a small number of discharges (111,000 or 0.3 percent) with missing gender.

‡ Female discharges are not statistically different from male discharges at  $p < 0.05$ .

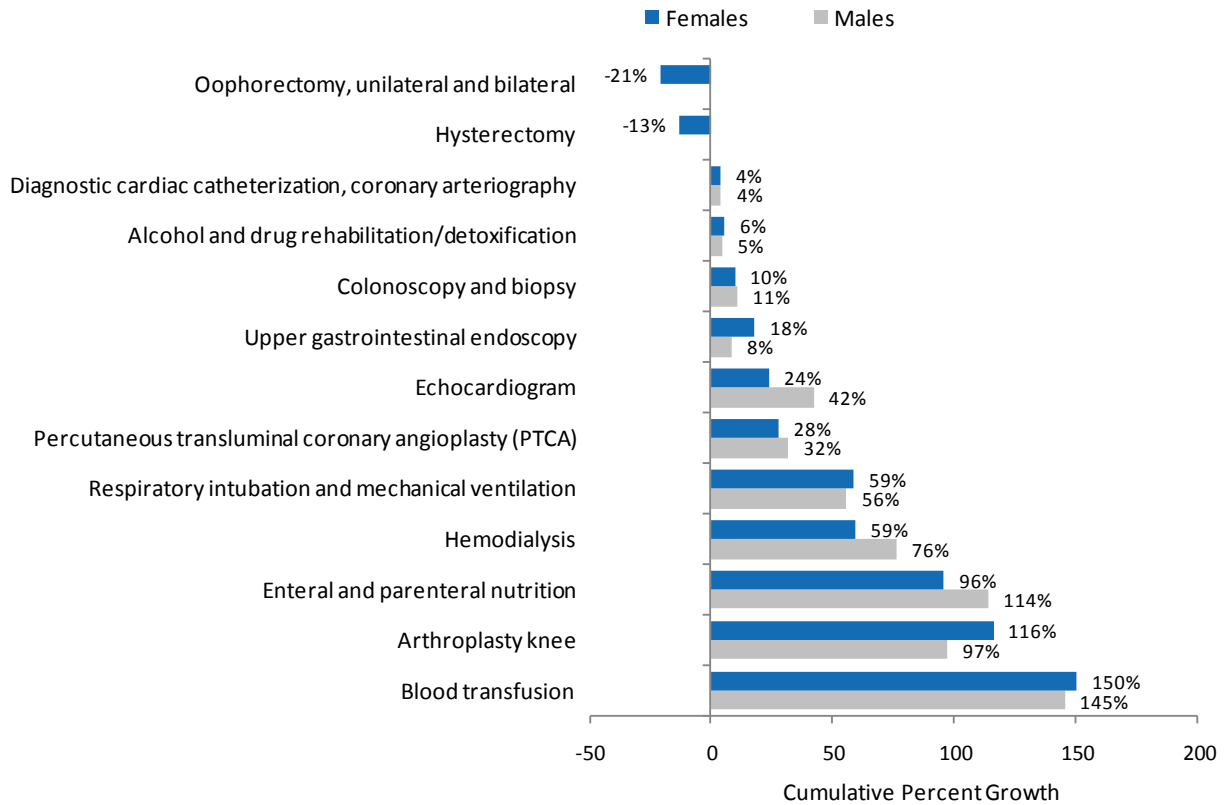
Source: AHRQ, Center for Delivery, Organization, and Markets, Healthcare Cost and Utilization Project, Nationwide Inpatient Sample, 2008.

When procedures related to childbirth and liveborn infants are excluded, males and females received similar procedures.

- Blood transfusion was the most common procedure for both genders when childbirth and liveborn infant procedures are excluded. Transfusion occurred in 13.7 percent of all procedure-related stays for males and 16.4 percent of stays for females.
- For procedures common to both males and females, some procedures occurred more frequently in one gender:
  - Two heart-related procedures—diagnostic cardiac catheterization and PTCAs—were performed more often for males than females. Diagnostic cardiac catheterization was performed in 10.8 percent of male discharges and 6.3 percent of female discharges in 2008 and was ranked as the second most frequent procedure in men and the fourth most frequent procedure in women.
  - PTCAs were performed in 5.9 percent of male stays and 2.7 percent of female stays. PTCA was the fifth most common procedure for men and the sixteenth most common for women.
  - Males also underwent more respiratory intubation and mechanical ventilation (9.0 percent of stays) than females (7.2 percent of stays). The procedure ranked third for both genders.
  - Males received alcohol and drug rehabilitation/detoxification (3.0 percent of male stays) more than females (1.3 percent of female stays). Alcohol and drug rehabilitation/detoxification ranked tenth for males and thirty-sixth for females.
  - Females received blood transfusion, upper gastrointestinal endoscopy, colonoscopy and biopsy, and arthroplasty of the knee more often than males.
  - For all other top ranking procedures (echocardiogram, hemodialysis, and enteral and parenteral nutrition), there was little difference between males and females in the volume of procedures performed.

- Hysterectomy and oophorectomy were the fifth and ninth most common procedures for females, respectively.

**Growth of the Most Frequent All-listed Procedures for Females and Males,\* 1997-2008**



\*Excludes procedures related to pregnancy and childbirth.

Source: AHRQ, Center for Delivery, Organization, and Markets, Healthcare Cost and Utilization Project, Nationwide Inpatient Sample, 1997 and 2008.

From 1997 to 2008, all discharges grew by 15 percent and discharges with a procedure grew by 18 percent. Growth varied widely among common procedures, but less so between females and males within a given procedure.

- The number of discharges for blood transfusion, the most frequent procedure for both genders, was among the fastest growing common procedures since 1997, increasing by 150 percent for females and 145 percent for males.
- Other rapidly growing procedures for both females and males were arthroplasty of the knee (116 and 97 percent, respectively), enteral and parenteral nutrition (96 and 114 percent, respectively), hemodialysis (59 and 76 percent, respectively), and respiratory intubation and mechanical ventilation (59 percent for females and 56 percent for males).
- Colonoscopy, alcohol and drug rehabilitation/detoxification, and diagnostic cardiac catheterization grew slowly or remained stable for both females and males.
- Although hysterectomies and oophorectomies increased during the 5-year period from 1997-2002, these female-specific procedures declined in subsequent years. Over the 1997 to 2008 period, hysterectomies decreased by 13 percent and oophorectomies by 21 percent.