

# Assessing Outcomes of IUD-Related Uterine Perforation and IUD Expulsion Before and After ICD-9-CM to ICD-10-CM Transition

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## DISCLOSURES

RTI Health Solutions, Kaiser Permanente Northern California (KPNC), Kaiser Permanente Southern California (KPSC), Kaiser Permanente Washington (KPWA), and Regenstrief Institute (RI) received funding from Bayer AG to conduct this research. The contracts between the research sites and Bayer AG include independent publication rights. The authors had the final decision on the content of this poster.

## BACKGROUND

- Health care databases are increasingly used for medication and device postmarket safety studies.
- Electronic health records provide a rich source of structured and unstructured data, but changes in the data over time and the potential impact on study results must be considered.
- On October 1, 2015, the United States transitioned from the use of International Classification of Diseases, Ninth Revision, Clinical Modification (ICD-9-CM) to International Classification of Diseases, Tenth Revision, Clinical Modification (ICD-10-CM) coding.

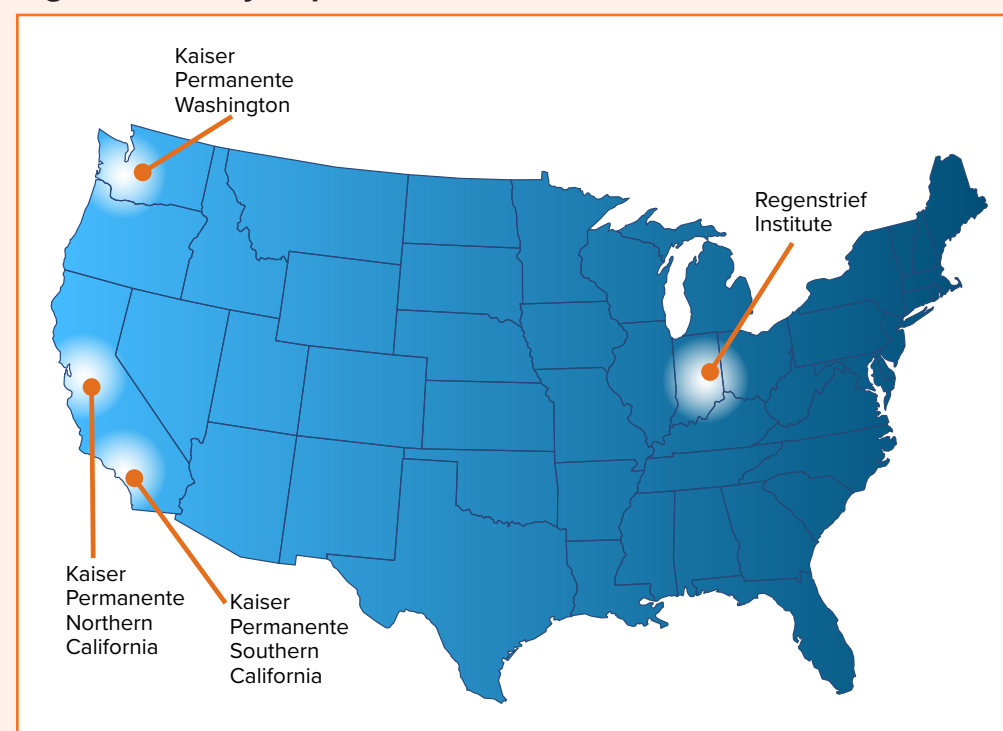
## OBJECTIVE

- The purpose of this analysis was to assess the reliability of algorithms that were validated with ICD-9-CM codes and then transitioned to ICD-10-CM codes under the assumption of no temporal trends that would affect the incidence of the outcomes of interest.

## METHODS

- Four sites in the United States participated: three Kaiser Permanente sites—Northern California, Southern California, Washington—and Regenstrief Institute in Indiana (see Figure 1).

Figure 1. Study Population Catchment Areas

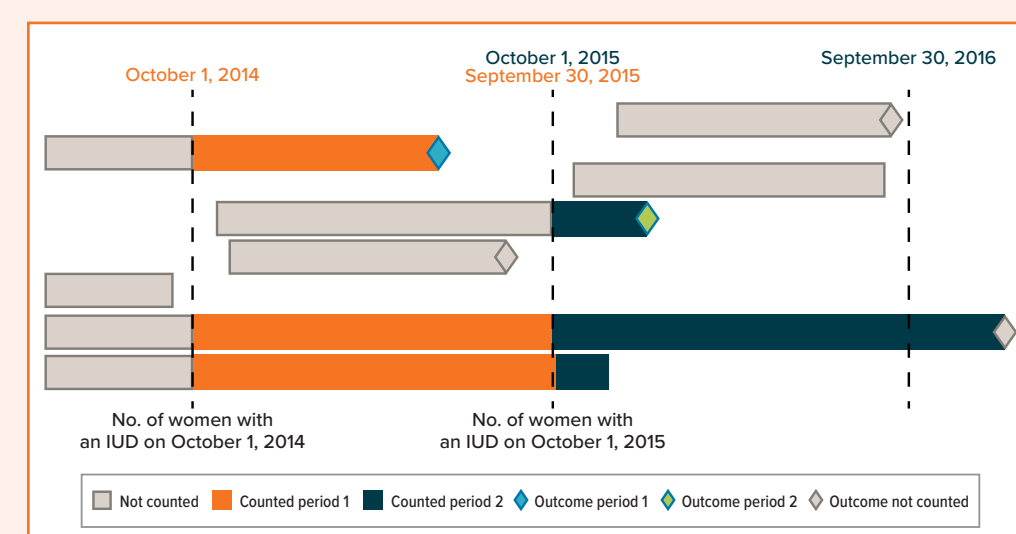


- The proportion of women with an outcome in the 12 months before and 12 months after implementation of ICD-10-CM coding among those with an intrauterine device (IUD) on the first day of each 12-month period was assessed separately for uterine perforation and expulsion (Figure 2).

- Previously validated,<sup>1</sup> site-specific algorithms for uterine perforation and IUD expulsion—developed using structured data (e.g., ICD-9-CM, Current Procedural Terminology codes, National Drug Codes) and unstructured data (natural language processing terms found in clinical notes)—were utilized, replacing ICD-9-CM with the mapped ICD-10-CM codes.

- The relative percentage change comparing the 12 months after implementation of ICD-10-CM codes with the 12 months before (and 95% confidence limits) was calculated for each outcome.

Figure 2. Schematic of the Analytic Approach: Counts of Outcome Events and Number in the Denominator<sup>a</sup>



<sup>a</sup> Percentage = Number of outcome events in the 1-year time period (October 1, 2014-September 30, 2015; October 1, 2015-September 30, 2016) divided by the total number women with an IUD in place on October 1, 2014, or October 1, 2015.

## RESULTS

- The number at risk and number of uterine perforation and IUD expulsion events are shown in Table 1.
- In the data pooled across sites, the proportion of women with uterine perforation was 0.11% in the 12 months before ICD-10-CM code implementation and 0.12% in the 12 months after (Figure 3). The number of uterine perforation events within 12 months at each site ranged from 0.06% to 0.33% before ICD-10-CM and 0.09% to 0.18% after ICD-10-CM (Figure 3).
- The proportions of women with an IUD expulsion in the 12 months before and 12 months after ICD-10-CM code implementation were 0.72% and 0.77%, respectively (Figure 5). The number of expulsions within 12 months at each site ranged from 0.54% to 0.85% before ICD-10-CM and 0.50% to 0.91% after ICD-10-CM (see Figure 5).
- Across research sites, the proportions of IUD-related outcomes observed before and after ICD-10-CM code implementation were relatively consistent. At RI, all potential cases of perforation or expulsion, and at KPWA, all potential cases of perforation, were manually reviewed to verify case status (Figure 3 and Figure 5).
- The relative percentage change in the proportion of women with uterine perforation in the 12 months after compared with the 12 months before ICD-10-CM implementation varied from -45% to +38% across research sites, but the 95% confidence intervals all included 0 (Figure 4).
- The relative percentage change in the proportion of women with IUD expulsion in the 12 months after compared with the 12 months before ICD-10-CM implementation varied from -19% to +12% across the research sites, but the 95% confidence intervals all included 0 (Figure 6).

Figure 3. Proportion of Women With an IUD-Related Uterine Perforation Within the 12 Months Before and 12 Months After Implementation of ICD-10-CM Codes

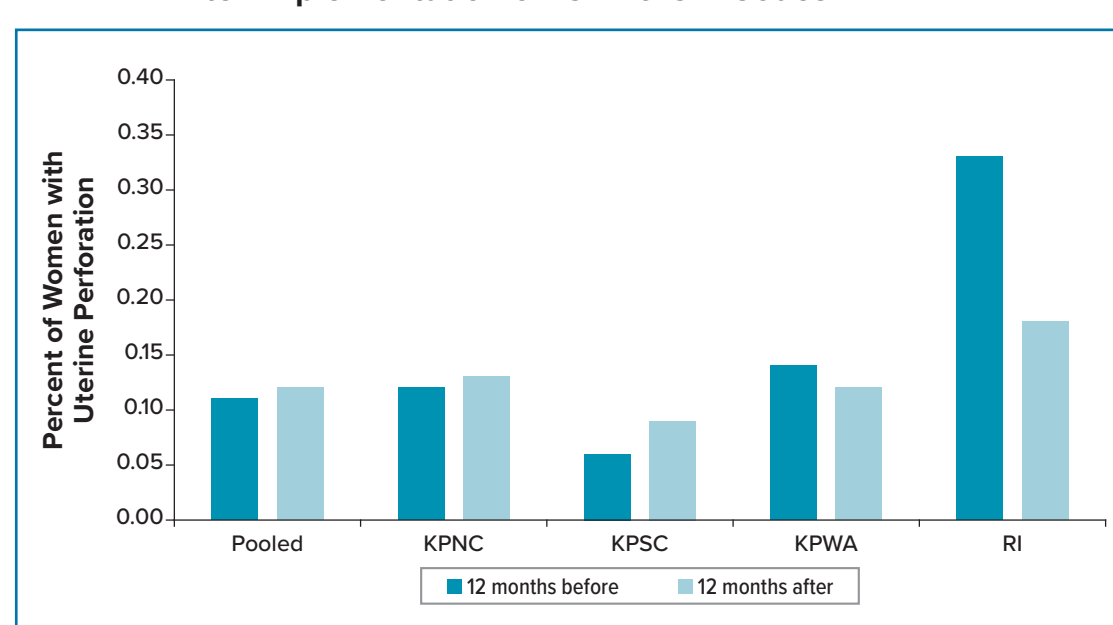


Figure 5. Proportion of Women With an IUD Expulsion Within the 12 Months Before and 12 Months After Implementation of ICD-10-CM Codes

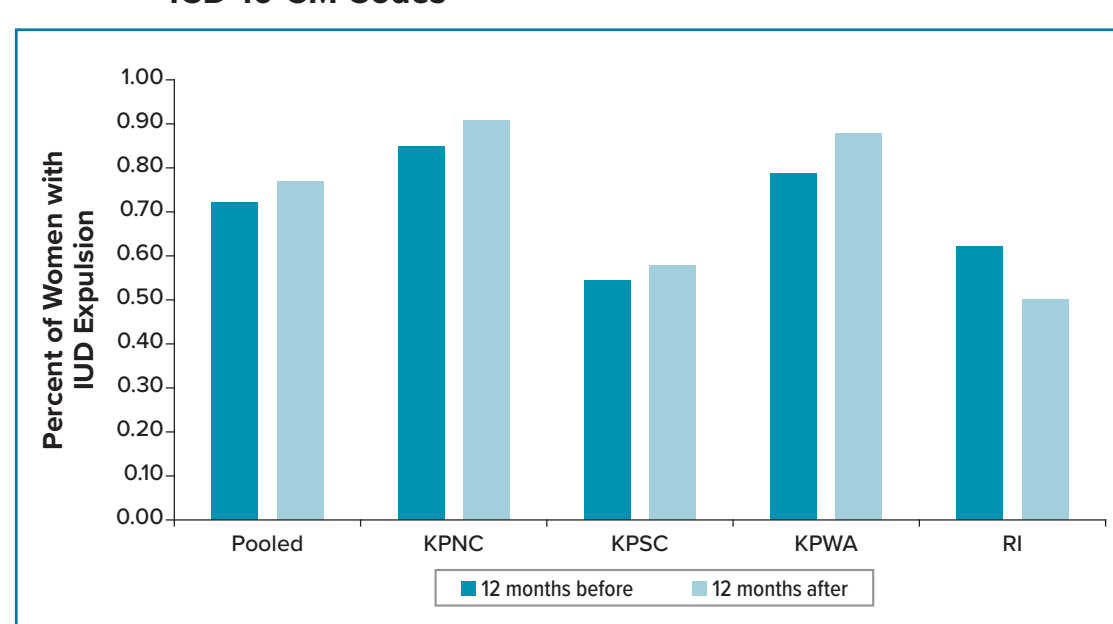


Figure 4. Relative Percentage Change for Uterine Perforation (± 95% Confidence Intervals) After vs. Before Implementation of ICD-10-CM Codes

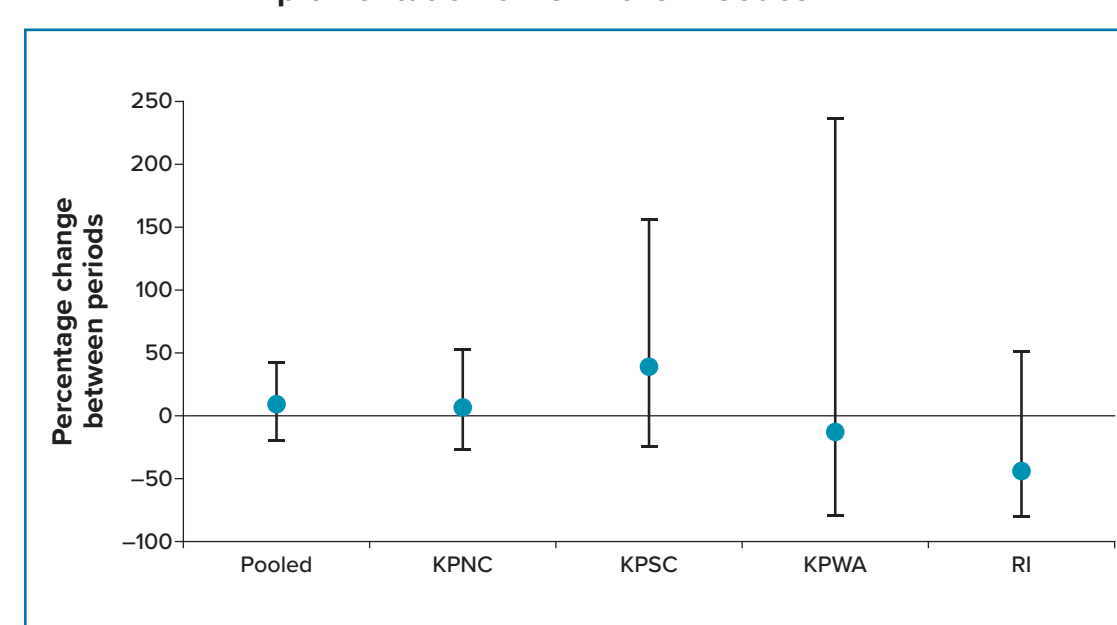


Figure 6. Relative Percentage Change (± 95% Confidence Intervals) After vs. Before Implementation of ICD-10-CM Codes for IUD Expulsion

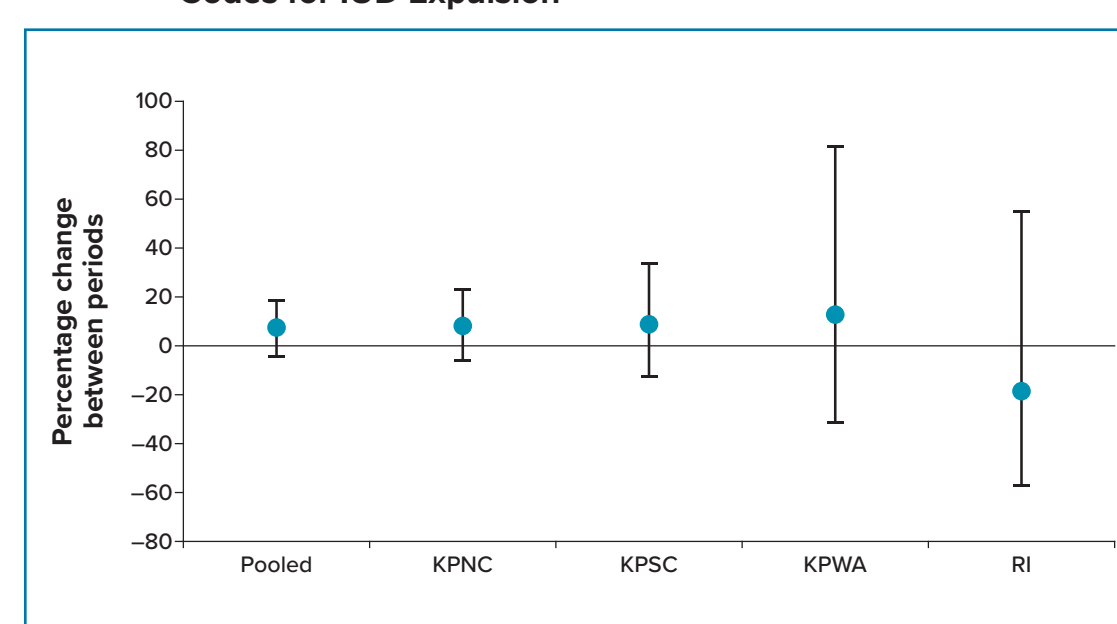


Table 1. Number of Women With IUD-Related Uterine Perforation or IUD Expulsion Within the 12 Months Before and 12 Months After Implementation of ICD-10-CM Codes

Research Site	12 Months Before ICD-10-CM Implementation			12 Months After ICD-10-CM Implementation			Percentage Change	
	Number at Risk N	Uterine Perforation n	IUD Expulsion n	Number at Risk N	Uterine Perforation n	IUD Expulsion n	Uterine Perforation % (95% CI)	IUD Expulsion % (95% CI)
Pooled	84,929	93	614	91,851	108	709	7.38% (-19.38%, 43.25%)	6.77% (-4.30%, 19.15%)
KPNC	46,297	57	392	49,866	65	455	5.87% (-26.96%, 53.84%)	7.76% (-6.06%, 23.66%)
KPSC	31,116	20	168	32,668	29	191	38.11% (-24.51%, 157.57%)	8.29% (-12.45%, 34.04%)
KPWA	4,442	6	35	4,313	5	38	-14.17% (-79.28%, 237.53%)	11.82% (-31.23%, 82.30%)
RI	3,074	10	19	5,004	9	25	-44.71% (-80.12%, 51.40%)	-19.17% (-57.25%, 55.26%)

KPNC = Kaiser Permanente Northern California; KPSC = Kaiser Permanente Southern California; KPWA = Kaiser Permanente Washington; RI = Regenstrief Institute.

## DISCUSSION AND CONCLUSIONS

- Before and after the transition from ICD-9-CM to ICD-10-CM codes, the proportion of women with these outcomes was not appreciably different, suggesting no important impact of the ICD code change on the identification of these outcomes.
- At RI and KPWA, where estimates were more variable, all potential cases of uterine perforation were confirmed by chart review, and, at RI, all potential cases of IUD expulsion were confirmed by chart review, so the impact of change from ICD-9-CM to ICD-10-CM codes is expected to be small.
- In the absence of a second outcome validation study using ICD-10-CM codes, this approach provided some evidence about whether there might be an effect of the change from ICD-9-CM to ICD-10-CM codes on incidence rates of uterine perforation and IUD expulsion at these study sites.

## REFERENCE

- Anthony MS, Armstrong MA, Getahun D, Scholes D, Gatz J, Schulze-Rath R, et al. Identification and validation of uterine perforation, intrauterine device expulsion, and breastfeeding in four health care systems with electronic health records. *Clin Epidemiol*. 2019;11:635-43.

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