I. Description

Transcatheter uterine artery embolization (UAE) is a minimally invasive technique that involves the injection of small particles into the uterine arteries to block the blood supply to the uterus and uterine fibroids. It potentially serves as an alternative to hysterectomy. UAE has also been used to treat postpartum hemorrhage, cervical ectopic pregnancy, uterine arteriovenous malformations, and adenomyosis.

For individuals who have uterine fibroids who receive transcatheter UAE, the evidence includes randomized controlled trials (RCTs) and systematic reviews. Relevant outcomes are symptoms, quality of life, resource utilization, and treatment-related morbidity. The studies have generally found similar levels of symptoms and quality of life after UAE versus surgery. There were more reinterventions in the UAE group, but some women avoided surgery and maintained their uteruses. Moreover, studies have found lower complication rates after UAE versus surgery. The evidence is sufficient to determine qualitatively that the technology results in a meaningful improvement in the net health outcome.

For individuals who have persistent uterine fibroids despite prior uterine artery embolization who receive repeat transcatheter UAE, the evidence includes case series. Relevant outcomes are symptoms, quality of life, resource utilization, and treatment-related morbidity. Case series have shown that a high degree of symptom relief is possible after a repeat UAE for uterine fibroids. Moreover, evidence from RCTs on the safety and efficacy of UAE for initial treatment of uterine fibroids can be extrapolated to repeat procedures for the same indication. The evidence is sufficient to determine qualitatively that the technology results in a meaningful improvement in the net health outcome.

For individuals who have postpartum uterine hemorrhage who receive transcatheter UAE, the evidence includes case series and a systematic review. Relevant outcomes are overall survival, symptoms, and treatment-related morbidity. The systematic review of case series with over 1400 women found a rate of success of stopping bleeding. Postpartum uterine hemorrhage is an emergency situation with serious potential consequences (i.e., maternal mortality). Conducting
RCTs is particularly difficult in this setting and may be unnecessary when there are sufficient uncontrolled data. The evidence is sufficient to determine qualitatively that the technology results in a meaningful improvement in the net health outcome.

For individuals who have cervical ectopic pregnancy who receive transcatheter UAE, the evidence includes case series. Relevant outcomes are resource utilization and treatment-related morbidity. Only a few case series with a small number of patients have been published. Additional studies, especially controlled studies comparing UAE to medication or surgery, are needed to draw conclusions about the safety and efficacy of UAE in patients with cervical ectopic pregnancy. The evidence is insufficient to determine the effects of the technology on health outcomes.

For individuals who have uterine arteriovenous malformations (AVM) who receive transcatheter UAE, the evidence includes case reports, case series, and a systematic review. Relevant outcomes are symptoms, resource utilization, and treatment-related morbidity. Only case reports and case series with a small number of patients have been published. A systematic review identified 54 women in 40 studies with uterine AVM treated using UAE. Additional studies, especially controlled studies comparing UAE to hysterectomy, are needed to draw conclusions about the safety and efficacy of UAE in patients with uterine AVM. The evidence is insufficient to determine the effects of the technology on health outcomes.

For individuals who have adenomyosis who receive transcatheter UAE, the evidence includes case series and a systematic review. Relevant outcomes are symptoms, resource utilization, and treatment-related morbidity. A systematic review of case series data found short-term improvement in 83% of patients and long-term improvement in 65% of patients, suggesting possible recurrence of symptoms over time. All studies were case series and may have been subject to selection and/or observational biases. Controlled studies comparing UAE to medication or surgery and studies reporting long-term symptom recurrence rates are needed. The evidence is insufficient to determine the effects of the technology on health outcomes.

II. **Criteria/Guidelines**

A. Transcatheter embolization of uterine arteries as a treatment of uterine fibroids or as a treatment of postpartum uterine hemorrhage is covered (subject to Limitations and Administrative Guidelines) when recommended by a gynecologist when the following criteria are met:
   1. Asymptomatic fibroids of such size that they are palpable abdominally and are a concern to the patient; OR
   2. Excessive uterine bleeding as evidenced by either profuse bleeding lasting more than 8 days, or anemia due to acute or chronic blood loss; OR
   3. Pelvic discomfort caused by myomata, either acute severe pain, chronic lower abdominal pain, or low back pressure or bladder pressure with urinary frequency not due to urinary tract infection.

B. One repeat uterine artery embolization may be performed when there is documentation of continued symptoms such as bleeding or pain.

C. The patient understands and is informed of the risks associated with future fertility/pregnancy.
III. Limitations
Transcatheter embolization of uterine arteries as a treatment management of all other indications, including cervical ectopic pregnancy, uterine arteriovenous malformation, and adenomyosis is not covered as it is not known to be effective in long-term health outcomes.

IV. Administrative Guidelines
A. Precertification is not required. HMSA reserves the right to perform retrospective review using the above criteria to validate if services rendered met payment determination criteria. The following information should be kept in the patient’s medical record and be made available upon request:
1. Supporting documentation that the procedure is medically necessary for the condition.
2. Pelvic ultrasound or MRI report performed within the past three months.
3. A current negative endometrial biopsy report for patients with a history of abnormal uterine bleeding or when endometrial cancer is suspected.
B. The following evaluations (if applicable) must be performed prior to the procedure and documented in the patient's medical records:
1. A current negative pregnancy test result for child-bearing age patients suspected of being pregnant.
2. A current negative test for any sexually transmitted diseases (e.g., gonorrhea and chlamydia) for patients with a history of pelvic inflammatory disease or for patients at risk of or suspected of having a sexually transmitted disease.

<table>
<thead>
<tr>
<th>CPT Codes</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>37204</td>
<td>Transcatheter occlusion or embolization (e.g., for tumor destruction, to achieve hemostasis, to occlude a vascular malformation), percutaneous, any method, non-central nervous system, non-head or neck</td>
</tr>
<tr>
<td>37243</td>
<td>Vascular embolization or occlusion, inclusive of all radiological supervision and interpretation, intraprocedural roadmapping, and imaging guidance necessary to complete the intervention; for tumors, organ ischemia, or infarction</td>
</tr>
<tr>
<td>36245-36247</td>
<td>Selective catheter placement, arterial system; each first, second, or third order branch, respectively</td>
</tr>
</tbody>
</table>

V. Background
Uterine leiomyomata (i.e., fibroids) are extremely common benign tumors that can be located primarily within the uterine cavity (submucosal fibroids) or on the serosal surface of the uterus. Treatment for uterine fibroids is usually sought when they are associated with menorrhagia, pelvic pain, urinary symptoms (i.e., frequency), or are suspected to cause infertility. Treatment options include medical therapy with gonadotropin agonists or gestagen suppression or various types of surgical therapy. Hysterectomy is considered the definitive surgical treatment for those who no longer want to maintain fertility. Various types of myomectomy, which describes removal of the fibroid with retention of the uterus, have also been described. Hysteroscopic myomectomy
involves removal of submucosal fibroids using a resectoscope or a laser. Subserosal fibroids can be removed via an open abdominal or laparoscopic approach. Laparoscopic laser coagulation of uterine fibroids is a unique approach in that the fibroid is not physically removed, but instead multiple (up to 75) laparoscopic laser punctures of the uterine fibroids are performed in an effort to devascularize the fibroid and induce atrophy.

There is interest in techniques to directly devascularize the uterine fibroid by interrupting the uterine arteries. One technique, uterine artery embolization (UAE), involves selective catheterization of the uterine arteries with injection of embolization material. UAE has also been used to control bleeding in situations such as severe postpartum hemorrhage, cervical ectopic pregnancy, bleeding uterine arteriovenous malformation, and adenomyosis.

**UAE for Treatment of Uterine Fibroids**

**Initial UAE Procedure for Uterine Fibroids**
A number of randomized controlled trials (RCTs) evaluating UAE for treatment of uterine fibroids and several systematic reviews of these RCTs have been published. A 2014 Cochrane review included 7 RCTs comparing UAE with other surgical interventions in women with symptomatic uterine fibroids. Four of the RCTs excluded women who desired pregnancy in the future. The comparison intervention was hysterectomy in 3 trials, hysterectomy or myomectomy in 2 trials, and myomectomy in 2 trials. The review’s primary outcomes were patient satisfaction and live birth rates (the latter analysis limited to studies where the comparison intervention was a uterine-sparing procedure). Pooled analyses did not find statistically significant differences in patient satisfaction with UAE or other interventions after 2 years (6 trials; odds ratio [OR], 0.94; 95% confidence interval [CI], 0.59 to 1.48) or 5 years (2 trials; OR=0.90; 95% CI, 0.45 to 1.80). Only 1 study reported live birth rates so meta-analysis was not possible. UAE was associated with a higher rate of minor complications at 1 year (6 trials; OR=1.99; 95% CI, 1.41 to 2.81), and there was no statistically significant difference between groups in the rate of major complications. Moreover, the UAE group was significantly less likely to require a blood transfusion than the surgery group (2 trials; OR=0.07; 95% CI, 0.01 to 0.52). The rates of further surgical interventions within 2 years was significantly increased in the UAE group (6 trials; OR=3.72; 95% CI, 2.28 to 6.04).

**Systematic Reviews**

In 2011, van der Kooij et al published a systematic review and meta-analysis of RCTs comparing UAE and surgery for treating symptomatic uterine fibroids and presenting up to 5 years of follow-up data. The investigators identified 11 articles reporting on 5 RCTs. The overall intraprocedural and early postprocedural complication rates were similar with both procedures. However, hospital length of stay, need for blood transfusion, and febrile morbidity were significantly lower in the UAE group than in the surgery group. At 12 months, a pooled analysis of 2 studies found a significantly higher reintervention rate in the UAE group than in the surgery group (OR=5.78; 95% CI, 2.14 to 15.58). Pooled analyses of quality-of-life (QOL) variables at 12 months found no significant differences between groups. Results were similar after 5 years. The reintervention rate was significantly higher at 5 years, based on pooled analysis of 2 trials (OR=5.41; 95% CI, 2.48 to 11.81).

A 2013 systematic review and meta-analysis by Martin et al focused on complication and reintervention rates following UAE for symptomatic uterine fibroids. Eight RCTs comparing UAE with another intervention were included. Among the 350 UAE cases in the RCTs, the most
common complications were discharge and fever (4%), postembolization syndrome (2.9%), pain (2.9%), and groin complications (2.9%). Six trials also provided data on 346 cases of surgery for uterine fibroids. The most common complications postsurgery were urinary stress incontinence (3.8%), pressure symptoms (2.9%), and menorrhagia (2.6%). Three trials presented reintervention data and, in meta-analysis of these studies, there was a significantly higher risk of reintervention after UAE than after surgery, but a wide confidence interval indicating imprecision of the risk estimate (OR=6.04; 95% CI, 2.0 to 18.1).

A 2014 systematic review and meta-analysis by Das et al identified 10 studies comparing the efficacy of 1 embolic agent used in UAE to another intervention or comparing 2 embolic agents. Five studies were RCTs and 5 were controlled trials that were not randomized. Embosphere microspheres were used in all of the RCTs. In a pooled analysis of data from 2 studies comparing Embosphere with spherical polyvinyl alcohol for treatment of uterine fibroids, there was no statistically significantly between-group difference in outcomes (uterine volume reduction and dominant fibroid volume reduction). Data from other studies were not pooled, but a qualitative analysis of study findings did not suggest that any agent was clearly superior or inferior to any other agent.

**Randomized Controlled Trials**

The Randomized Trial of Embolization versus Surgical Treatment for Fibroids (REST) multicenter trial assigned patients 2:1 to undergo UAE (n=106) or surgery (n=43 hysterectomies, n=8 myomectomies).6 The embolization group had lower postoperative pain (3.0 vs 4.6, respectively) and faster recovery (eg, median length of hospitalization, 1-day vs 5-day, respectively). Of 7 identified pregnancies in the UAE group, 2 resulted in successful live births. Five-year follow-up data from the REST trial were published in 2011.7 A total of 144 (92%) of 157 randomized patients were included in the 5-year analysis. QOL and symptom scores were similar in the 2 groups at 5 years. For example, the mean symptom score was 4.5 in the UAE group and 4.8 in the surgery group (scores ranged from 15 [markedly worse] to 5 [markedly better]). By the 5-year follow-up, 27 (25%) of 106 in the UAE group and 2 (4%) of 51 in the surgery group had received an additional intervention for continued or recurrent symptoms. The total rate of further intervention for symptoms or adverse events over the 5-year period was 32% in the UAE group and 4% after surgery. In the UAE group, there were 3 procedural failures, 8 repeat UAEs, and 18 hysterectomies. Note that 1 woman had both a repeat UAE and a hysterectomy, and 2 women were not embolized after randomization and subsequently underwent surgery.

The Embolization versus hysterectomy (EMMY) trial from the Netherlands included 177 women with uterine fibroids and heavy menstrual bleeding who were scheduled to undergo hysterectomy.8,9 They were randomized to receive UAE (n=88) or hysterectomy (n=89). By the 2-year follow-up, 19 (23%) of the 81 women who actually received UAE had undergone a hysterectomy. An analysis of health-related QOL (HRQOL) outcomes at 2 years found similar improvement in both groups. The Defecation Distress Inventory score improved significantly in only the UAE group starting at 6 months. A report of 5-year outcome data from the EMMY trial was published in 2010.10 At 5 years, 70 (79%) of the 89 patients originally randomized to the hysterectomy group and 75 (85%) of 88 in the UAE group completed questionnaires. In an intention-to-treat analysis, 23 (28.4%) of 81 women who had received UAE underwent hysterectomy during the 5 years. Including the hysterectomies, 58 (71.6%) of 81 women in the
UAE group no longer had menorrhagia. There were no significant differences between groups in HRQOL at 5 years, as assessed by the Physical and Mental Component Summary scores of the 36-Item Short-Form Health Survey. Ten-year outcomes were reported by de Bruijn et al in 2016.11 Completed questionnaires were available for 131 (75%) of 177 randomized patients at 10 years. An additional 5 hysterectomies were performed between the 5- and 10-year follow-ups, for a total of 28 (35%) hysterectomies in the UAE group. At 10 years, there were no statistically significant differences between groups in HRQOL or in urinary and defecation function.

In 2012, findings of the Fibroids of the Uterus: Myomectomy versus Embolization (FUME) trial from the U.K. were published.12 The investigators randomized women with symptomatic fibroids to UAE (n=82) or myomectomy (n=81). Mean hospital stay was significantly shorter after UAE (2 days) than after surgery (4 days; p<0.001). There were no significant differences in minor or major complications. A total of 120 (74%) women of 163 were available for the analysis of QOL, the primary outcome measure. There were no significant differences between groups in change in QOL scores from baseline to 1 year. Nine (11%) patients in the UAE group required additional intervention and 3 (4%) patients in the myomectomy group later underwent hysterectomy.

An RCT by Hald et al in Norway evaluated clinical outcomes in 66 premenopausal women (mean age, 43 years) with symptomatic uterine fibroids who were assigned to laparoscopic occlusion of uterine arteries or to UAE.13 Women who wanted to bear children in the future, had a large uterus, had undergone multiple open abdominal surgeries, and who had bleeding disorders were excluded. The primary outcome was reduction in blood loss at 6 months postintervention, as measured by a pictorial blood loss assessment chart. Fifty-eight women underwent treatment, 29 in each group. The proportion of women who had a reduction in blood loss after 6 months did not differ between the treatment groups (52% after UAE vs 53% after laparoscopy; p=0.96). Follow-up data were reported at a median of 48 months posttreatment (range, 8-73 months).14 The cumulative clinical failure and recurrence rate was significantly lower in the UAE group (17% [n=5]) compared with the laparoscopy group (48% [n=17]; p=0.02).

Moreover, fewer patients in the UAE group (7% [n=2]) had a hysterectomy than in the laparoscopy group (28% [n=8]; p=0.41). The authors concluded that UAE is superior to laparoscopic occlusion of uterine arteries for treatment of uterine fibroids.

**Section Summary: Initial UAE for Uterine Fibroids**

A number of RCTs and systematic reviews have compared UAE and surgery (hysterectomy or myomectomy) for treating uterine fibroids. A Cochrane review found similar levels of patient satisfaction after UAE and surgery. There were a lower blood transfusion rates and higher reintervention rates after UAE. Other meta-analyses have found lower complication rates and higher reintervention rates after UAE than after surgery; however, some women were able to avoid surgery and maintain their uteruses. The available evidence from RCTs does not suggest that any one embolization agent is clearly superior to another.

**Repeat UAE Procedures for Recurrent or Persistent Uterine Fibroid Symptoms**

No RCTs focusing on repeat UAE were identified; there are published case series. In 2009, McLucas and Reed published a study in which the charts of 1058 women who had undergone initial bilateral UAE at several U.S. centers were reviewed.15 Forty-two (4%) patients had documented persistent symptoms, and they were offered a second bilateral UAE. Thirty-nine patients had
repeat procedures, and 34 (87%) of them completed a follow-up questionnaire at least 6 months postembolization. Before the second UAE procedure, 27 (79%) of the 34 women reported severe bleeding, with only 2 (6%) women reported severe bleeding postprocedure. Similarly, the number of women with severe pain decreased from 20 (59%) to 2 (6%), and with severe pressure decreased from 18 (53%) to 2 (6%). Four women experienced severe levels of 1 or more symptoms after the second UAE.

In 2006, Yousefi et al reported on 24 patients who underwent repeat embolization for recurrent or persistent symptoms 6 to 66 months after the initial UAE. The most common symptoms were pressure and/or bulk symptoms (n=15), recurrent heavy bleeding (n=12), and pelvic pain or cramping (n=7). Follow-up data were available on 21 (87.5%) of 24 after the second UAE; 19 (90%) reported symptom control.

Section Summary:
Repeat UAE Procedures for Recurrent or Persistent Uterine Fibroid Symptoms There is a lack of RCTs on repeat UAE for treatment of symptoms associated with uterine fibroids. However, there are data from case series showing high rates of success after a second UAE for recurrent or persistent symptoms. Moreover, evidence from RCTs on the safety and efficacy of an initial UAE for treating uterine fibroids can be extrapolated to the repeat UAE situation.

UAE for Postpartum Uterine Hemorrhage
Systematic Reviews
No RCTs or other comparative studies evaluating UAE for treating postpartum hemorrhage were identified. Several systematic reviews of the literature on treatments for postpartum hemorrhage have been published. In 2016, Sathe et al reported that rates of successful bleeding control with UAE in uncontrolled studies ranged from 58% to 98%, with a total of 1251 (87%) of 1435 patients in 15 studies achieving successful control of bleeding.17 Previously, In 2012, Rath et al published a systematic review of literature on second-line treatment of postpartum hemorrhage.18 Success rates of UAE for postpartum hemorrhage reported in uncontrolled studies ranged from 70% to 100%, and from 60% to 83% in placenta accreta.

Case Series
Representative larger case series are described next. In 2013, Kim et al evaluated data on 60 women who underwent UAE for treatment of postpartum hemorrhage at a single center in Korea. The clinical success rate (which was not explicitly defined) was reported as 96%. Eleven patients treated with UAE experienced transient fever after the procedure, and there was 1 case of ovarian failure. During study data collection, another 61 patients at the same center underwent cesarean hysterectomy for treatment of postpartum hemorrhage; the success rate associated with that procedure was 93%.

In 2011, Ganguli et al published data on 66 women who underwent UAE for the treatment of postpartum hemorrhage. The clinical success rate (defined as obliteration of hysterectomy) was 95%. Three (5%) of 66 women had a subsequent hysterectomy. In addition to the 3 clinical failures, there were 3 (5%) major complications after UAE: 1 case each of lower-extremity deep vein thrombosis, postprocedural pancreatitis, and presumed endometritis. Nine pregnancies after UAE were identified; there were 2 spontaneous abortions and 7 viable gestations.
In 2009, Kirby et al retrospectively analyzed data from 43 women who underwent UAE for primary postpartum hemorrhage. Clinical success was defined as cessation of bleeding without need for repeat embolization, laparotomy, or hysterectomy and without mortality. Eight (19%) of 43 women had a hysterectomy before UAE. Of the remaining 35 women, clinical success was achieved in 29 (83%) women. Considering the sample as a whole, the clinical success rate was 29 (67%) of 43. Complications among women who had UAE without a previous hysterectomy included 1 case each of groin hematoma, inadvertent perforation of the left obturator artery during UAE, bleeding necrotic fibroid tumor, and symptoms consistent with endometritis.

Section Summary: UAE for Postpartum Uterine Hemorrhage
There is a lack of RCTs or other controlled studies on repeat UAE for treatment of postpartum hemorrhage. Case series involving nearly 1500 patients have shown a high rate of successfully stopping bleeding. Without treatment, there is a high likelihood of significant ongoing hemorrhage and maternal mortality. Given that this is an emergent, often clinically complex situation that can result in maternal mortality, it may not be practical to conduct RCTs and positive case series data may suffice.

Fertility and Pregnancy Outcomes after UAE for Uterine Fibroids or Postpartum Hemorrhage
Several systematic reviews on fertility and pregnancy outcomes after UAE have been published. In 2014, Doumouchtsis et al identified 17 studies (total N=675 participants) reporting on fertility outcomes after UAE for postpartum hemorrhage. To be selected, studies had to report on a minimum of 5 cases. None identified was an RCT. A total of 168 (25%) of the 675 patients wanted a pregnancy following UAE, and 126 (75%) of the 168 women who desired pregnancy conceived. There were 136 term live births and 30 cases of pregnancy loss (ectopic pregnancy, miscarriage, elective abortion). Previously, in 2013, Mohan et al identified 21 studies reporting pregnancy outcomes and/or pregnancy complications after UAE for treatment of uterine fibroids or postpartum hemorrhage. The authors reported that the cumulative pregnancy and miscarriage rates among women trying to conceive following UAE for uterine fibroids were 59% and 28%, respectively, and the cumulative live birth rate was 65%. The term delivery rate was 61%. In the studies on UAE for postpartum hemorrhage, the cumulative pregnancy rate, based on a small number of pregnancies, was 87.2%. Rates of miscarriage and live births were not reported following UAE for postpartum hemorrhage. Most studies included in the systematic review were observational and had no or inadequate controls. There was 1 RCT. This 2008 study, by Mara et al in Czech Republic, randomized 121 women with uterine fibroids who desired future pregnancies to UAE or myomectomy. Participants were followed for a mean of 25 months; they were advised to wait for at least 6 months postprocedure before attempting to conceive. At final follow-up, 13 (50%) of 26 women in the UAE group who tried to conceive became pregnant compared with 31 (76%) of 40 in the myomectomy group; the difference between groups was not statistically significant. Among women in the UAE group who became pregnant, the abortion rate was 64% and the delivery rate was 19%. In the myomectomy group, the abortion rate was 23%, and the delivery rate was 48%.

Section Summary: Fertility and Pregnancy Outcomes after UAE for Uterine Fibroids or Postpartum
Hemorrhage Reviews of fertility and pregnancy outcomes after UAE have suggested that successful pregnancy is possible after UAE for treatment of uterine fibroids or postpartum hemorrhage. One review found higher rates of miscarriage and postpartum hemorrhage with UAE than with myomectomy. There are limited data on pregnancy outcomes in women who became pregnant following UAE for treatment of postpartum hemorrhage.

**UAE for Cervical Ectopic Pregnancy**

No RCTs or other comparative studies evaluating UAE for treating cervical ectopic pregnancy were identified. The published literature consisted of small case series. Sample sizes ranged from 2 to 20 patients, and most studies had fewer than 10 patients. The largest prospective series was conducted in China by Xiaolin et al. Patients received methotrexate injections before, during, and after the UAE procedure. Median follow-up was 12 months (range, 1-50 months). Two (10%) of 20 patients had recurrent vaginal bleeding; the other 18 had no significant bleeding after UAE. Five (25%) patients had an additional curettage procedure due to bleeding and/or high levels of β-human chorionic gonadotropin. The uterus was preserved in all patients, and normal menses resumed after 2 to 4 months. Eight (50%) of 16 women who attempted to conceive achieved a normal pregnancy within 1 year. There were 2 miscarriages and 6 live births at term.

**Section Summary: UAE for Cervical Ectopic Pregnancy**

There is a lack of RCTs or other controlled studies on repeat UAE for treatment of cervical ectopic pregnancy. Only a few case series are available, the largest of which included 20 patients. The limited noncomparative evidence is insufficient to determine the effect of UAE on health outcomes. Additional data, ideally controlled trials comparing UAE to alternative treatments (eg, medication, surgery) are needed to determine the safety and efficacy of UAE for treating cervical ectopic pregnancy.

**UAE for Uterine Arteriovenous Malformation**

No RCTs or other comparative studies evaluating UAE for treating uterine arteriovenous malformations (AVMs) were identified. The published literature consists of case reports, small case series, and a systematic review. A 2016 systematic review of literature on acquired uterine AVMs identified 54 women treated with UAE in 40 studies, primarily case reports. There were 22 unilateral and 32 bilateral procedures. Thirty-three (61%) of 54 patients had symptoms controlled with the initial embolization procedure. No major complications were reported after UAE. The most recent and largest series, published in 2014 by Kim et al in Korea, retrospectively reviewed data from a single center on 19 patients who underwent UAE as first-line treatment of bleeding uterine AVMs.27 All patients presented with intermittent or progressive vaginal bleeding after gynecologic procedures or obstetric events. The UAE procedures were bilateral, and a variety of embolization agents were used. Seventeen (89.5%) of 19 patients had immediate clinical success following the UAE, defined as cessation of bleeding without symptom recurrence and resolution of the uterine AVMs on postoperative imaging studies.

**Section Summary: UAE for Uterine Arteriovenous Malformation**

The limited noncomparative evidence is insufficient to determine the effect of UAE on health outcomes in patients with bleeding associated with uterine AVMs. Additional data, ideally
controlled trials comparing UAE to alternative treatments (eg, hysterectomy), are needed to determine the safety and efficacy of UAE for treating uterine AVMs.

**UAE for Adenomyosis Systematic Reviews**

No RCTs or other comparative studies evaluating UAE for treating adenomyosis were identified. A 2011 systematic review by Popovic et al evaluated literature on UAE for patients with adenomyosis, alone or in conjunction with uterine fibroids. The reviewers identified 8 case series reporting short-term follow-up in patients with adenomyosis alone. After a median follow-up of 9.4 months (range, 3-12 months), 85 (83%) of 102 patients had marked or complete improvement in clinical symptoms. Six case series reported long-term follow-up (median, 40.6 months; range, 17-60 months). Marked or complete improvement occurred in 135 (65%) of 208 patients, suggesting recurrence of symptoms over time in some patients. No deaths or serious adverse events were reported.

**Case Series**

Additional case series have been published after the Popovic systematic review. In 2016, Wang et al prospectively reported on 117 premenopausal patients with adenomyosis who underwent UAE. A total of 115 (98%) of 117 patients who successfully underwent bilateral UAE were included in the analysis. At 12 months, patients were queried about change in dysmenorrhea symptoms. Thirteen (11.3%) patients reported slight symptom improvement, 64 (55.7%) reported moderate improvement, and 31 (27.0%) reported marked improvement. Seven (6%) patients reported no change. In 2015, Bae et al retrospectively reviewed outcomes in 50 women who underwent UAE for symptomatic adenomyosis and were followed for at least 18 months. At baseline, 41 (82%) of 50 women had both heavy menstrual bleeding and dysmenorrhea; the remainder reported only 1 of these 2 symptoms. The extent of necrosis of adenomyosis was significantly associated with the likelihood of experiencing symptoms at follow-up. In receiver operating characteristic curve analysis, a cutoff of 34.3% necrosis was the most predictive of symptom recurrence (area under the curve, 0.721; 95% CI, 0.577 to 0.839; p=0.004). Among 12 patients with less than 34.3% necrosis, 58% were symptom-free at 18 months; among 40 patients with greater than 34.3% necrosis, 94% were symptom-free at 18 months.

**Section Summary: UAE for Adenomyosis**

There is a lack of RCTs or other controlled studies on repeat UAE for treatment of cervical ectopic pregnancy. Several case series and a systematic review are available. The systematic review found short-term symptom improvement in 83% of patients and long-term improvement in 65% of patients. Additional data from controlled trials are needed, especially on long-term efficacy and recurrence rates.

**Ongoing and Unpublished Clinical Trials**

Some currently unpublished trials that might influence this review are listed in Table 1.

<table>
<thead>
<tr>
<th>NCT No.</th>
<th>Trial Name</th>
<th>Planned Enrollment</th>
<th>Completion Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ongoing</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Summary of Evidence

For individuals who have uterine fibroids who receive transcatheter uterine artery embolization (UAE), the evidence includes randomized controlled trials (RCTs) and systematic reviews. Relevant outcomes are symptoms, quality of life, resource utilization, and treatment-related morbidity. The studies have generally found similar levels of symptoms and quality of life after UAE versus surgery. There were more reinterventions in the UAE group, but some women avoided surgery and maintained their uteruses. Moreover, studies have found lower complication rates after UAE versus surgery. The evidence is sufficient to determine qualitatively that the technology results in a meaningful improvement in the net health outcome.

For individuals who have persistent uterine fibroids despite prior uterine artery embolization who receive repeat transcatheter UAE, the evidence includes case series. Relevant outcomes are symptoms, quality of life, resource utilization, and treatment-related morbidity. Case series have shown that a high degree of symptom relief is possible after a repeat UAE for uterine fibroids. Moreover, evidence from RCTs on the safety and efficacy of UAE for initial treatment of uterine fibroids can be extrapolated to repeat procedures for the same indication. The evidence is sufficient to determine qualitatively that the technology results in a meaningful improvement in the net health outcome.

For individuals who have postpartum uterine hemorrhage who receive transcatheter UAE, the evidence includes case series and a systematic review. Relevant outcomes are overall survival, symptoms, and treatment-related morbidity. The systematic review of case series with over 1400 women found a rate of success of stopping bleeding. Postpartum uterine hemorrhage is an emergency situation with serious potential consequences (i.e., maternal mortality). Conducting RCTs is particularly difficult in this setting and may be unnecessary when there are sufficient uncontrolled data. The evidence is sufficient to determine qualitatively that the technology results in a meaningful improvement in the net health outcome.

For individuals who have cervical ectopic pregnancy who receive transcatheter UAE, the evidence includes case series. Relevant outcomes are resource utilization and treatment-related morbidity. Only a few case series with a small number of patients have been published. Additional studies, especially controlled studies comparing UAE to medication or surgery, are needed to draw conclusions about the safety and efficacy of UAE in patients with cervical ectopic pregnancy. The evidence is insufficient to determine the effects of the technology on health outcomes.

For individuals who have uterine arteriovenous malformations (AVM) who receive transcatheter UAE, the evidence includes case reports, case series, and a systematic review. Relevant outcomes are symptoms, resource utilization, and treatment-related morbidity. Only case reports and case series with a small number of patients have been published. A systematic review identified 54 women in 40 studies with uterine AVM treated using UAE. Additional studies, especially controlled studies comparing UAE to hysterectomy, are needed to draw conclusions about the safety and
efficacy of UAE in patients with uterine AVM. The evidence is insufficient to determine the effects of the technology on health outcomes.

For individuals who have adenomyosis who receive transcatheter UAE, the evidence includes case series and a systematic review. Relevant outcomes are symptoms, resource utilization, and treatment-related morbidity. A systematic review of case series data found short-term improvement in 83% of patients and long-term improvement in 65% of patients, suggesting possible recurrence of symptoms over time. All studies were case series and may have been subject to selection and/or observational biases. Controlled studies comparing UAE to medication or surgery and studies reporting long-term symptom recurrence rates are needed. The evidence is insufficient to determine the effects of the technology on health outcomes.

Clinical Input Received from Physician Specialty Societies and Academic Medical Centers While the various physician specialty societies and academic medical centers may collaborate with and make recommendations during this process, through the provision of appropriate reviewers, input received does not represent an endorsement or position statement by the physician specialty societies or academic medical centers, unless otherwise noted.

In response to requests, input was received from 3 physician specialty societies and 2 academic medical centers while this policy was under review in 2012. There was consensus among reviewers that UAE is medically necessary for treating uterine fibroids and near-consensus agreement that UAE is medically necessary for treating postpartum hemorrhage, particularly for the indications stated in the American College of Obstetricians and Gynecologists Practice Bulletin No. 76 (described in more detail in the next section). Clinical input was mixed on repeat UAE and UAE for managing cervical ectopic pregnancy. One reviewer who disagreed that repeat UAE is investigational provided detailed input on clinical situations in which a repeat procedure might be appropriate.

Practice Guidelines and Position Statements American College of Obstetricians and Gynecologists

In 2014, American College of Obstetricians and Gynecologists (ACOG) reaffirmed a 2008 Practice Bulletin on alternatives to hysterectomy in the management of leiomyomas. This Bulletin (No. 96) contained the following statement on UAE: “Based on long- and short-term outcomes, uterine artery embolization is a safe and effective option for appropriately selected women who wish to retain their uteri.”

In 2013, ACOG issued a committee opinion on the management of acute abnormal uterine bleeding in nonpregnant reproductive aged women. The committee listed UAE among the surgical options for acute abnormal uterine bleeding and stated that the need for surgical treatment, including UAE, is based on the clinical stability of the patient, the severity of bleeding, contraindications to medical management, the patient’s lack of response to medical management, and the underlying medical condition of the patient.

In 2014, ACOG reaffirmed a Practice Bulletin (No. 76) on management of postpartum hemorrhage. The bulletin states that UAE may be indicated under the following circumstances: “A patient with stable vital signs and persistent bleeding, especially if the rate of loss is not excessive, may be a candidate for arterial embolization. Radiographic identification of bleeding vessels allows
embolization with Gelfoam, coils, or glue. Balloon occlusion is also a technique used in such circumstances. Embolization can be used for bleeding that continues after hysterectomy or can be used as an alternative to hysterectomy to preserve fertility.”

**Society of Obstetricians and Gynecologists of Canada**
In 2015, the Society of Obstetricians and Gynecologists of Canada published a clinical practice guideline on management of uterine leiomyomas. The guideline stated: “Of the conservative interventional treatments currently available, uterine artery embolization has the longest track record and has been shown to be effective in properly selected patients.”

**Society of Interventional Radiology**
The 2010 (reviewed and unchanged in 2014), quality improvement guidelines from the Society of Interventional Radiology stated that uterine artery embolization is indicated in women with uterine leiomyomas that are causing significant symptoms. Absolute contraindications to UAE are viable pregnancy, active infection, and suspected uterine, cervical, or adnexal malignancy (unless the procedure is being performed for palliation or in conjunction with surgery). A desire to maintain fertility is a relative contraindication.

**U.S. Preventive Services Task Force Recommendations: Not applicable.**

**Medicare National Coverage**
There is no national coverage determination (NCD). In the absence of an NCD, coverage decisions are left to the discretion of local Medicare carriers.

**VI. Important Reminder**
The purpose of this Medical Policy is to provide a guide to coverage. This Medical Policy is not intended to dictate how to practice medicine. Nothing in this Medical Policy is intended to discourage or prohibit providing other medical advice or treatment deemed appropriate by the treating physician.

Benefit determinations are subject to applicable member contract language. To the extent there are any conflicts between these guidelines and the contract language, the contract language will control.

This Medical Policy has been developed through consideration of the medical necessity criteria under Hawaii’s Patients’ Bill of Rights and Responsibilities Act (Hawaii Revised Statutes §432E-1.4), generally accepted standards of medical practice and review of medical literature and government approval status. HMSA has determined that services not covered under this Medical Policy will not be medically necessary under Hawaii law in most cases. If a treating physician disagrees with HMSA’s determination as to medical necessity in a given case, the physician may request that HMSA reconsider the application of the medical necessity criteria to the case at issue in light of any supporting documentation.

**VII. References**


37.