

THE FIBROID FIX: WHAT WOMEN NEED TO KNOW

Uterine fibroid embolization avoids surgery, preserves the uterus,
controls symptoms and improves quality of life

August 29, 2017



Society of
Interventional
Radiology
The vision to heal™



THE SOCIETY OF INTERVENTIONAL RADIOLOGY is a nonprofit, professional medical society representing more than 7,000 practicing interventional radiology physicians, trainees, students, scientists and clinical associates, dedicated to improving patient care through the limitless potential of image-guided therapies.

METHODOLOGY: SIR commissioned a poll, conducted online by Harris Poll between June 23 and 27, 2017 among 1,176 U.S. women ages 18 and over, to better understand awareness of uterine fibroids and treatment options.

Because the sample is based on those who agreed to participate in the Harris Poll panel, no estimates of theoretical sampling error can be calculated. (For subgroup sample sizes and weighting variables, please contact Tamara Moore, at tmoore@theresigroup.com.)

PHYSICIAN AND PATIENT ADVISERS

The Society of Interventional Radiology would like to thank the physician advisers and patients that helped inform and develop this report.

PHYSICIAN ADVISERS

Sharon W. Kwan, MD, MS, FSIR
Janice M. Newsome, MD
James B. Spies, MD, MPH, FSIR
Robert L. Vogelzang, MD, FSIR

PATIENT ADVISERS

Kim Fenoglia
Tanya Brown

UTERINE FIBROIDS: WHAT WOMEN NEED TO KNOW



New survey findings demonstrate women's lack of awareness of uterine fibroids and their treatment options



A **UTERINE FIBROID** is a type of tumor that occurs in the uterus. These growths are typically not dangerous but for some, the symptoms can be difficult to face.

SYMPTOMS INCLUDE



Uterine pressure or pain



Heavy menstrual bleeding



Abdominal enlargement

The survey found a lack of awareness about uterine fibroids



Have never heard of uterine fibroids



Don't think they're at risk



Do not know anyone diagnosed with fibroids



Believe fibroids are cancerous, requiring uterus removal

UTERINE FIBROID EMBOLIZATION (UFE) is a minimally invasive treatment for uterine fibroids. Through a tiny incision in the skin, an interventional radiologist uses a catheter to deliver particles that block the blood vessels leading to the fibroids, causing them to shrink or disappear.

BENEFITS OF UFE



Shorter recovery time



Minimal complication risk



Preserves the uterus



Unlikely to cause menopause

Despite these benefits, many women don't know about UFE



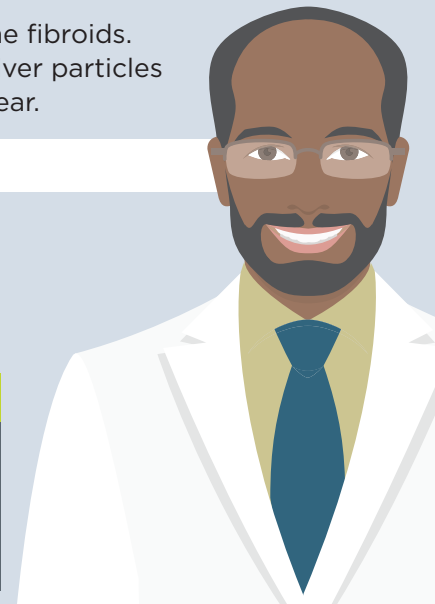
Most have never heard of UFE



Some think hysterectomy is the only option



Most who know of UFE did not learn of it from their OB-GYN



MOST WOMEN WILL BE AFFECTED by uterine fibroids by the time they are 50.¹ Unfortunately, women diagnosed with uterine fibroids are not being given the information they need to make informed decisions about their health.

Of women diagnosed with uterine fibroids



Say knowing that their doctor has discussed all options with them is the most important factor for selecting a treatment



Have never heard of UFE



Think hysterectomy is the only treatment option

For more information on uterine fibroids and treatment options, please visit our website at sirweb.org/fibroidfix

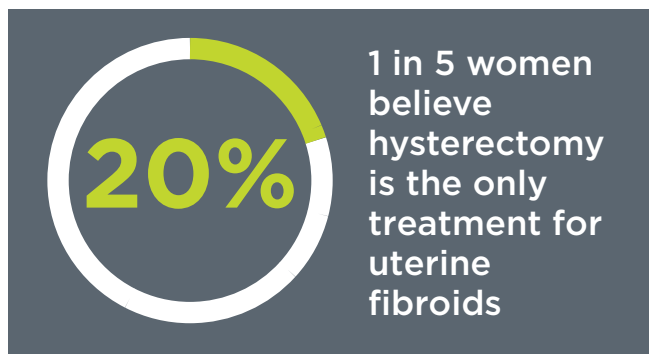
Survey Details: The survey was conducted online within the United States by Harris Poll on behalf of the Society of Interventional Radiology between June 23 and 27, 2017 among 1,176 U.S. women ages 18+ Sources: 1. Baird, D., et al. High cumulative incidence of uterine leiomyoma in black and white women: Ultrasound evidence. Am J Obstet Gynecol 2003; 188: 100-107.

EXECUTIVE SUMMARY

Most women will develop uterine fibroids by the age of 50,¹ but more than half of U.S. women (57 percent) do not think they are at risk, according to a new survey conducted online by Harris Poll on behalf of the Society of Interventional Radiology.

While some women may not experience symptoms, others have very heavy and prolonged bleeding that, along with the physical effects of the condition, can be debilitating. Women with fibroids often face pelvic pain, a diminished sex life, heavy menstrual bleeding and declining energy levels. These experiences go beyond discomfort and result in many women feeling a sense of hopelessness and a perception that their uterine fibroids are controlling their lives.

Women with fibroids may be embarrassed by the condition and unwilling to share their experiences with others. In fact, despite the high prevalence of the condition, results of this poll show that more than one-third of women (37 percent) have not personally been diagnosed, nor do they know anyone who has been diagnosed with uterine fibroids. The silence around the condition contributes to the lack of knowledge and the limited awareness of treatments, with one in five women in the United States (20 percent) believing



that the only treatment is hysterectomy, the complete removal of the uterus.

Some women might feel comfortable with that option, but others, especially those who want to preserve their uterus, may decide to live with their symptoms instead of pursuing treatment because they are unaware a minimally invasive treatment exists—uterine fibroid embolization, or UFE.

UFE is a non-surgical treatment, performed by interventional radiologists. Through a tiny incision in the skin, a catheter is guided via imaging to the vessels leading to the fibroids. Through this catheter, small particles are injected to block the blood flow leading to the fibroids causing them to shrink and disappear. **UFE produces less pain and has a shorter recovery period than surgical treatments, but a majority of women (62 percent) have never heard of it, despite more than 20 years of clinical use.**



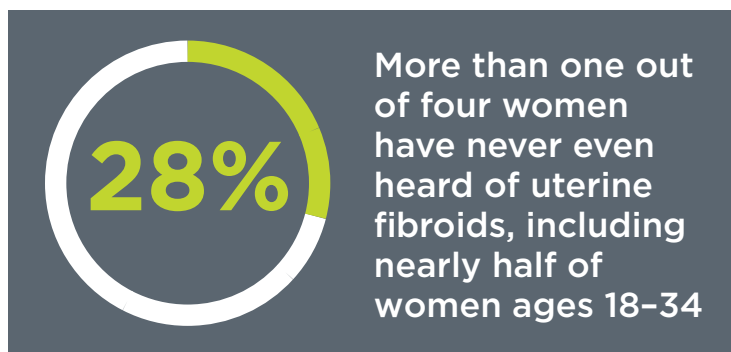
“I suffered from uterine fibroids for almost five years before I found relief. Every year the bleeding and pain got worse and worse, to the point I was on my cycle for three weeks and only off for one week. My doctor put me on a hormone to build up the lining of the uterus, but that only worked for a short time. I became anemic and had to start taking iron supplements. My hair started falling out, and, at times, I was doubled over

in pain. It was painful to have intercourse. The worst symptoms were the non-stop bleeding and how weak and tired that made me. It got to the point where I was so embarrassed of having to run to the restroom every 10 minutes that I couldn't leave the house. It was a disaster. I was desperate for help. My OB-GYN told me the only treatment option would be a hysterectomy, which would require removing my entire uterus and sending me into early menopause—when I was just 44 years old. Desperate for another solution, I visited four different OB-GYNs, who all told me the same thing. It was only through my own research that I found out about UFE; and I'm so glad that I did. Ever since my UFE treatment, my symptoms have disappeared, and it's like I never had fibroids. UFE has changed my life completely.”

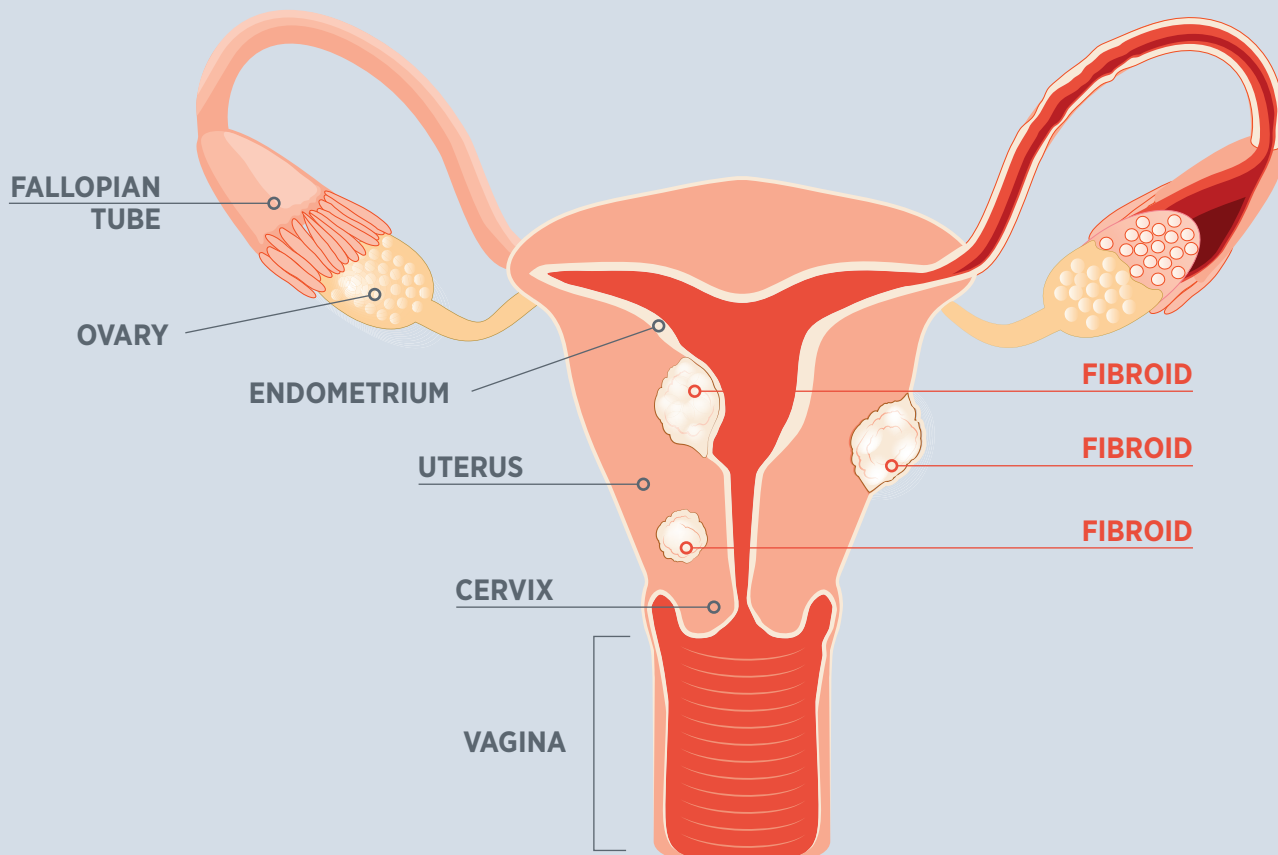
— Kim, 40 years old at time of diagnosis

Even those with fibroids struggle to get a clear understanding of the available treatment options, and more than two in five women who have been diagnosed with uterine fibroids (44 percent) have never heard of UFE. In fact, 73 percent of all women who have heard of UFE did not first learn of it from their OB-GYN, the frontline provider of fibroid treatment.

It is a disservice to women to not provide all the information needed for an informed decision. For women and their health care professionals who are weighing options to treat uterine fibroids, this report provides important information about UFE and the factors women should consider in choosing their treatment.



UTERINE FIBROIDS



Sources: Centers for Disease Control and Prevention; ttsz/iStockPhoto

BUSTING THE HYSTERECTOMY MYTH

Treatments range from simply monitoring fibroids, to removing the uterus by hysterectomy. For many women, surgery is not necessary. Below are some of the most common treatments available.



WATCHFUL WAITING: In some cases, clinicians will decide that monitoring the fibroids may be the best course of action. This may require the person to come back for relatively frequent check-ups and scans.



MEDICATIONS: Medication can be administered to help relieve the symptoms of uterine fibroids, such as heavy bleeding and pelvic pain; however, medication will not eliminate fibroids.



UTERINE FIBROID EMBOLIZATION (UFE): A minimally invasive, non-surgical treatment, UFE is performed through a tiny incision in the skin. Using real-time imaging, an interventional radiologist guides a catheter into the uterine arteries and then releases tiny particles—the size of grains of sand—to block the blood flow that supplies oxygen and nutrients to the fibroid tumors, causing them to shrink or disappear.



MYOMECTOMY: A myomectomy is a surgical procedure in which the uterus is preserved by removing the fibroid through a method such as a laparoscope. In some cases, a myomectomy may be used in conjunction with UFE to avoid a hysterectomy.



HYSTERECTOMY: This is the most invasive treatment, involving surgery to remove a woman's entire uterus. There are two approaches to the surgery—open, which involves a 5-to-7-inch incision, and a less-invasive surgical option, which can be done in various ways.



POTENTIAL TREATMENTS: Women may learn about other treatments from the internet, including magnetic resonance-guided focused ultrasound ablation (MRgFUS), laparoscopic ultrasound-guided radiofrequency ablation, and transcervical ultrasound. Further studies are needed to determine the short- and long-term efficacy and safety of these procedures relative to other treatment options for uterine fibroids.

UTERINE FIBROIDS: COMMON, YET UNKNOWN TO WOMEN

A uterine fibroid (leiomyoma) is a type of tumor that occurs in the muscle cells of the uterus. These growths do not spread to other regions of the body and are typically not dangerous. Symptoms caused by uterine fibroids include uterine pressure or pain, heavy menstrual bleeding, abdominal enlargement, pain with intercourse, constipation and frequent urination. Because most women will not exhibit every potential symptom, diagnosis is usually confirmed by using imaging of the pelvis, such as MRI or ultrasound.

There is limited information about the precise risk factors for uterine fibroids, but women are at increased risk for developing fibroids if they are African American, over the age of 40, have high blood pressure, are overweight, have had no children or have immediate family members with fibroids.²

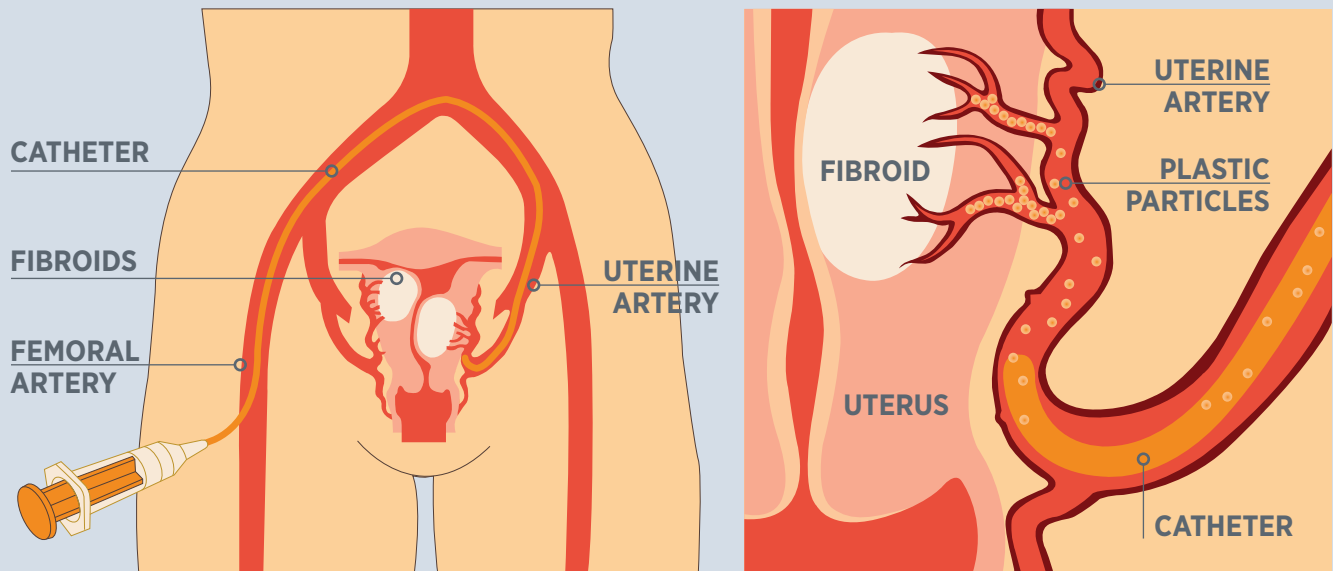
THE SURGICAL OPTION: INVASIVE, AND OFTEN UNNECESSARY

Almost 600,000 hysterectomies are performed each year in the U.S.³ But some hysterectomies may not even be necessary. A study published in the *American Journal of Obstetrics and Gynecology* showed that one in five women who had a hysterectomy for a noncancerous condition did not have evidence to support the need for surgery.⁴ Additionally, 40 percent of the women who got a hysterectomy to treat a noncancerous condition did not receive other treatments before undergoing the hysterectomy.⁵ It appears that many women are undergoing these procedures to treat their uterine fibroids without the knowledge of the other options available.

While hysterectomies are necessary for many conditions, they are often not needed

UTERINE FIBROID EMBOLIZATION (FEMORAL APPROACH)

Illustrated below is the femoral approach to UFE. Interventional radiologists can also perform UFE via the radial artery in the wrist.



Source: Society of Interventional Radiology

to treat uterine fibroids. Unfortunately, they seem to be presented as the only, or one of the best, options to treat these noncancerous growths. However, there are other possibilities for treatment that preserve the uterus and result in less pain than surgical options, and doctors must ensure patients are aware of them.

ANOTHER OPTION FOR WOMEN

Introduced more than 20 years ago, UFE is a proven therapy for the treatment of uterine fibroids and their symptoms.

UFE allows women to not only experience relief from their symptoms, but to get back to their lives more quickly and to avoid early menopause, sexual dysfunction and other side effects that can result from other treatments.

Emerging research also shows that women who choose UFE may maintain their ability to have children.^{6,7} Because of these benefits, women often report that they are very satisfied with UFE, and are just as likely to recommend it to their friends and

family members who develop fibroids as women who have undergone other treatments.⁸

Unfortunately, women's knowledge of UFE is lacking, and many have never even heard of it, including 70 percent of those aged 18–34. Additionally, even among women who have been diagnosed with fibroids, 44 percent have never heard of UFE. The fact that so many women are unaware of this well-established treatment is alarming and must change. This change begins with physicians who have the ability and obligation to inform their patients of all available treatment options. UFE may provide the solution to the many women seeking treatments for their fibroids.

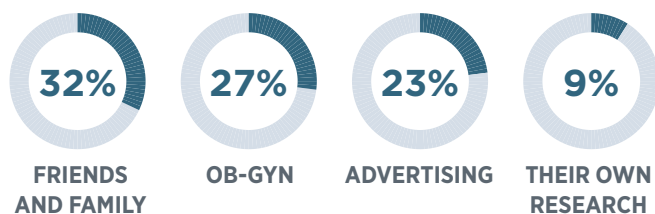
AN OUTPATIENT TREATMENT THAT ALLOWS PATIENTS TO RETURN TO THEIR LIVES SOONER

Because UFE is less invasive than surgery, it can be more appealing for many patients.

Most women leave the hospital on the day of or the day after treatment. Many patients also report that they can resume normal activity with their families and their jobs in about two weeks, more quickly than with surgical treatments.

WOMEN FIRST LEARN OF UFE FROM FRIENDS AND FAMILY

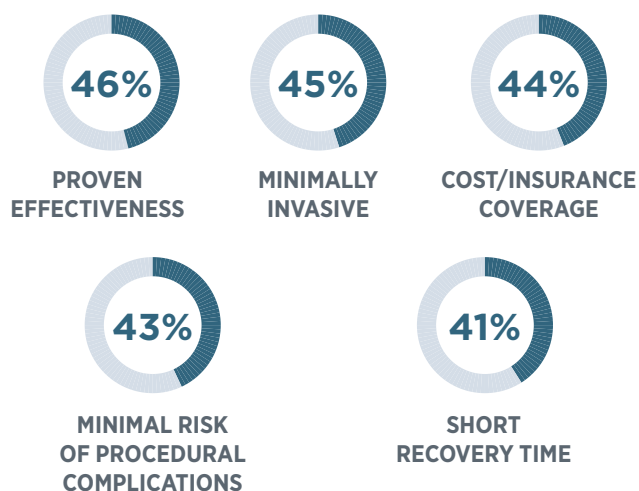
Even though UFE can be just as effective as other treatments and provide a number of additional benefits, many women are not aware of it, for a variety of reasons. According to the survey, three in four women who have heard of UFE (73 percent) did not first hear about it from their OB-GYN. The reason for the lack of awareness about UFE among this group may be that women are learning about treatment options less often from health care professionals than from various other sources:



There is clearly a missed opportunity for health care professionals to present all options to their patients in the exam room at the time of diagnosis.

WOMEN'S PREFERENCES POINT TO UFE

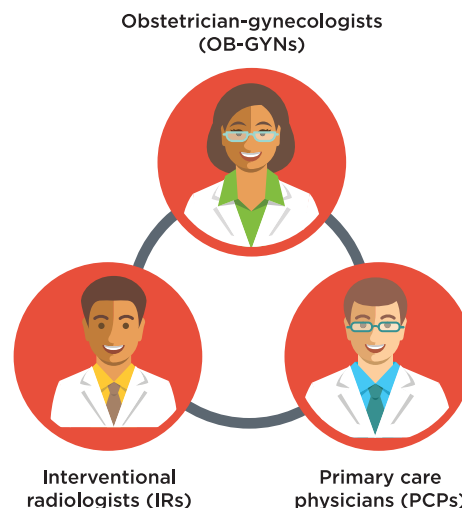
According to the survey, when thinking about the most important factors for selecting a uterine fibroid treatment, the top five considerations for women would be:



As these responses show, women who may be diagnosed with uterine fibroids in the future would prefer a treatment that is effective and minimally invasive. Unfortunately, the lack of knowledge of UFE suggests that patients are not being presented this option—even though it might be the best solution for them.

PARTNERS IN WOMEN'S HEALTH: THE UTERINE FIBROID CARE TEAM

It is important that if a woman is diagnosed with uterine fibroids, her care team inform her of all available treatment options.



Interventional radiologists (IRs) are physicians who perform minimally invasive procedures like UFE, which have less risk, less pain and less recovery time than traditional surgery. They perform targeted treatments that go directly to the source of a disease, guided by medical imaging such as X-rays, ultrasound, CT scans and MRIs.

Obstetrician-gynecologists (OB-GYNs) specialize in female reproductive health, which includes pregnancy and childbirth. When a woman experiences uterine fibroid symptoms, she will most likely turn first to her OB-GYN for diagnosis and treatment options.

Primary care physicians (PCPs) treat a variety of general illnesses and are often the first provider on the patient's care team to see an illness.

A BETTER WAY TO SYMPTOM RELIEF

Women suffering from uterine fibroids are not only looking for relief from their symptoms. They have multiple factors to consider. For some, taking the least amount of time off work is most important. For others, being able to maintain intimacy with a partner is primary. And others may not be ready to enter into early menopause.

Whatever the reason, UFE provides women many benefits not found with more invasive treatments. Clinicians need to take these factors into account so that, when possible, patients can avoid surgery.



SYMPTOM RELIEF WITH LOW RATES OF COMPLICATIONS

The outcomes of UFE and the impact on women's lives have been noted in a variety of studies. After treatment, UFE results in low rates of complications, similar to hysterectomy and myomectomy.⁹ Additionally, in both the short and long term, most women who underwent UFE reported that they are free of symptoms or experience great improvement.¹⁰



A LESS INVASIVE AND LESS PAINFUL OPTION

Many women who choose UFE instead of hysterectomy or myomectomy do so because the treatment is minimally invasive and less disruptive to their lives. One study found that women who chose UFE spent substantially less time in the treatment room than women who chose hysterectomy (79 minutes vs. 95.4 minutes)¹¹ or myomectomy (79 minutes vs. 109 minutes).¹² Additionally, women spend, on average, as little as one day in the hospital after UFE, compared to five days for women who undergo surgical treatments.¹³

CALL TO CLINICIANS: A TEAM-BASED APPROACH FOR UTERINE FIBROID TREATMENT



Every day, I care for patients who look to me for advice and guidance in some of the toughest decisions they will make, and I want to ensure that I give them all the information they need to make smart decisions about their health and their future—as I know every clinician strives to do.

Uterine preservation should be an important goal of therapy for fibroids. It is remarkable that about **one in 10 women diagnosed with uterine fibroids (11 percent) and 20 percent of all women mistakenly believe that hysterectomy is the only treatment option.** But decades of experience and research have demonstrated that UFE is an effective treatment and allows patients to get back to their lives sooner.

UFE is just one of the many treatments that interventional radiologists (IRs) perform, and it provides women another choice to fit their personal needs. IRs are integral members of the patient's clinical care team who use image guidance to deliver minimally invasive treatments with less risk, less pain and less recovery time than traditional surgery. IRs have helped thousands of women over the years treat their fibroids and regain control of their lives.

The Society of Interventional Radiology created this report for patients and health care professionals as an important resource in understanding non-surgical treatment options for uterine fibroids.

It is essential that health care providers present their patients with all the treatment options available. By working together, and using each other's expertise and knowledge base, we can ensure that patients are getting the care that is best for them.

— By James Spies, MD, MPH, FSIR



“I couldn’t believe the change in my symptoms after UFE. After just two weeks, I had so much more energy and was back to my old self—walking on trails, working out and getting back to normal activities. I’m so glad I elected to do UFE, and I’m thankful that my doctor said there was another option. My OB-GYN didn’t push me to get a hysterectomy, and she encouraged me to look into other forms of treatment. It made me feel empowered, knowledgeable and proud that I was taking responsibility for my well-being. UFE was the best thing that ever happened to me, and because of it, I feel like a new person.”

— Tanya, 45 years old at time of diagnosis

UFE is also known to be less painful than surgeries, making it a more appealing option for many women.

For instance, one study showed that within the first 24 hours after treatment, women reported experiencing less pain with UFE compared to those who underwent hysterectomies.¹⁴



A TREATMENT WITH A QUICKER RECOVERY TIME

Women who have chosen UFE usually did so because they wanted the least amount of disruption to their lives. Multiple studies have shown that women who undergo UFE go back to work and return to their lives in a shorter amount of time than women who chose surgical treatments.¹⁴ One large registry study found that UFE patients returned to work in an average of one and a half weeks, and restored their normal activities in about two weeks.¹⁵

Not only does UFE allow women to get back to doing what they love sooner, it also has been shown to improve the quality of their lives.

Several studies reported that most women said that UFE significantly improved their quality of life one month after treatment, reduced menstrual bleeding or even left them symptom-free.^{16,17} These improvements continued many years after treatment,¹⁸ and women report a high level of satisfaction with UFE, partly attributed to its minimally invasive nature.

Overall, UFE is a beneficial option for women, and there is no reason that it shouldn’t be considered

alongside myomectomy and hysterectomy. As the research shows, in the long run (up to 10 years), as women recovered from their treatments, all three groups (UFE, myomectomy and hysterectomy) reported similar satisfaction scores and had similar health-related quality of life.^{19, 20, 21, 22}



ACCESSIBLE ACROSS THE UNITED STATES

UFE is widely available, with thousands of interventional radiologists who perform the treatment located throughout the country.

Because of UFE’s history of effectiveness and safety, the treatment is covered by almost all insurers. Women should consult their insurance company for individual plan coverage terms.

WHAT ELSE SHOULD BE CONSIDERED WHEN CHOOSING A FIBROID TREATMENT?

In addition to the level of invasiveness and length of recovery, various additional factors that women may want to consider include:



THE POTENTIAL FOR PREGNANCY

Recent research shows that uterine fibroids do not have a significant impact on fertility,²³ while the removal of the uterus (hysterectomy) makes fertility impossible. Many women diagnosed with fibroids are under the

age of 44, meaning they can and may still want to have children. For many of these women, maintaining the ability to have children will be among the most important factors in choosing treatment.

Because the uterus remains intact with UFE, many women maintain the ability to have children, although it is not guaranteed. One study found that half of women under the age of 40 who desired pregnancy after UFE treatment had successful, full-term pregnancies. Additionally, researchers in this study noted that the course of these pregnancies was largely normal.²⁴ In another analysis, researchers reported that the pregnancy rate of UFE patients who averaged 36 years of age was about 60 percent, which is comparable to pregnancy rates in the general population, adjusting for age.²⁵

Women who wish to maintain the option of having children should discuss the risks and benefits of hysterectomy, myomectomy and UFE with their health care provider.



POTENTIAL TO IMPROVE SEX LIFE

Many women report that uterine fibroids interfere with their sex life. Often the desire and ability are not there because of heavy menstrual bleeding and pain. This not only disrupts the woman's life, but her partner's as well. Both will want to find a treatment that will help the woman's symptoms and get their sex life back on track. Fortunately, UFE has been shown to achieve this for many women.

A recent study found that UFE significantly improved a woman's quality of life and sex life. Researchers who spoke to women one year after UFE reported a significant improvement in the women's energy and mood, as well as reduced self-consciousness.²⁶

They also found women's desire for and satisfaction with sex increased, and there was less pain during sex.



CONCERN ABOUT MENOPAUSE

Women who get a hysterectomy will often enter menopause after the surgery, and this is a certainty if the ovaries are removed during surgery. Even women who undergo ovary-sparing hysterectomy, compared to women not undergoing surgery, have nearly twice the risk of ovarian failure, which can lead to the onset of menopause symptoms.²⁷ A woman who is over 50 may not be bothered by this notion, since menopause will occur soon anyway; but a woman in her 20s, 30s or even 40s may not be ready to enter this stage of life. The idea of entering early menopause is upsetting for many women, which is why women should be aware that there are other options that will allow them to treat their fibroids while delaying menopause. Those undergoing UFE can have the onset of menopause, but in the vast majority of women, this does not occur and normal menstrual cycles are restored and preserved.



UFE IS MORE COST-EFFECTIVE

Because of the strong evidence supporting the effectiveness of the treatment, UFE is covered by most insurance providers. Additionally, an analysis of UFE has found that, for a health care facility, it is more cost-effective than a hysterectomy.²⁸ The cost difference can be attributed to the shorter time required to perform the treatment, as well as shorter length of hospital stays, if hospitalization is even required. Direct hospital costs differ from the cost to patients, which depends in part on insurance coverage.



NO GREATER RISK FOR CANCER

According to our survey, nearly one in five women (19 percent) believe fibroids are typically cancerous and require complete removal of the uterus; however, uterine fibroids are almost never cancerous and do not increase a woman's chances of getting cancer in other areas of the uterus. If a woman's doctor indicates that she is at high risk for ovarian or uterine cancer, the

best option for treatment of her fibroids may be a hysterectomy.



FEW WOMEN REQUIRE FOLLOW-UP TREATMENT

Women who elect UFE or myomectomy should know that there is a possibility that fibroids may return. If the UFE treatment is successful and destroys the existing fibroids, there is a chance that new fibroids may grow in the future. There is a similar rate of recurrence in women who have surgical removal of their fibroids through myomectomy.²⁹ A study examining 10-year outcomes after UFE saw that about one in three (35 percent) UFE patients had hysterectomies because of persistent menstrual problems or pain.³⁰

The likelihood of needing additional treatment increases for women who have a history of smoking, are African American, or have a body mass index greater than 25.³¹ The likelihood of recurring fibroids also increases over time. For women who have undergone UFE, the second uterine fibroid treatment can be another UFE, and they are not necessarily limited in their treatment options.³² While some women eventually must be treated again, the minimally invasive nature of the treatment, and the fact that they do not have to have their uterus removed outweigh the negatives for many women. In fact, women who chose UFE and needed a second treatment reported that they were still very satisfied with their choice five years later—a satisfaction rate similar to women who had hysterectomies and did not require additional treatments.³³

IS UFE RIGHT FOR YOU? FIGURE OUT YOUR FIBROID FIX

	ASK YOURSELF	<input checked="" type="checkbox"/>
PREGNANCY	Do I want to have children in the future?	<input type="checkbox"/>
MENOPAUSE	Do I want to avoid taking hormones or going through early menopause?	<input type="checkbox"/>
COMPLICATIONS	Am I worried about complications, such as pain or infection?	<input type="checkbox"/>
SURGERY	Would I prefer to undergo a minimally invasive treatment over major surgery even if it meant I might have to go through the treatment again?	<input type="checkbox"/>
RECOVERY	Would a shorter recovery time be preferable for my lifestyle?	<input type="checkbox"/>

If you checked three or more of the boxes, then uterine fibroid embolization may be the right treatment option for you. Bring this checklist to your next appointment with your OB-GYN or primary care physician to start a discussion about UFE and its potential to help treat your uterine fibroids.

WOMEN DESERVE TO KNOW ALL THEIR OPTIONS

A woman diagnosed with uterine fibroids has many options for treatment; unfortunately, many women are not aware of them. The lack of awareness of uterine fibroids, despite the high prevalence of the disorder, and the fact that a majority of women have never even heard of UFE, are alarming. Every woman's symptoms are different, as are the factors in her life that will be impacted by the treatment she chooses. Ensuring that women have the complete information they need to make the right decision about treatment is vital to providing the best care possible. That includes educating women about treatments beyond hysterectomy or other surgical options. Women deserve to know about UFE, and it is the job of clinicians to help inform them.

RESOURCES ABOUT UTERINE FIBROIDS AND UFE

For more information about uterine fibroids and the treatments available, visit any of the websites listed below.

Society of Interventional Radiology—Uterine fibroids: www.sirweb.org/fibroidfix

Office of Women's Health, U.S. Department of Health and Human Services—Uterine fibroids: <https://www.womenshealth.gov/a-z-topics/uterine-fibroids>

National Institute of Health U.S. National Library of Medicine—Uterine fibroids: <https://medlineplus.gov/uterinefibroids.html>

REFERENCES

1. Baird, D., et al. High cumulative incidence of uterine leiomyoma in black and white women: Ultrasound evidence. *Am J Obstet Gynecol* 2003; 188: 100-107.
2. Baird, D., et al. High cumulative incidence of uterine leiomyoma in black and white women: Ultrasound evidence. *Am J Obstet Gynecol* 2003; 188: 100-107.
3. Centers for Disease Control and Prevention. Data and Statistics: Hysterectomy. 2017. Retrieved from https://www.cdc.gov/reproductivehealth/data_stats/
4. Corona, L., et al. Use of other treatments before hysterectomy for benign conditions in a statewide hospital collaborative. *Am J Obstet Gynecol* 2015; 212(3): 304.e1-7.
5. Corona, L., et al. Use of other treatments before hysterectomy for benign conditions in a statewide hospital collaborative. *Am J Obstet Gynecol* 2015; 212(3): 304.e1-7.
6. McLucas, B., Pregnancy following uterine artery embolization: An update. *Minim Invasive Ther Allied Technol* 2013; 22:39-44.
7. Mohan, P., et al., Uterine artery embolization and its effect on fertility. *J. Vasc. Interv. Radiol.* 2013; 24-925-30.
8. Moss, JG. et al., Randomised comparison of uterine artery embolisation (UAE) with surgical treatment in patients with symptomatic uterine fibroids (REST Trial): 5-year results. *BJOG* 2011;118: 936-44.
9. van der Kooji, S. et al., Uterine artery embolization versus surgery in the treatment of symptomatic fibroids: a systematic review and meta analysis. *Am J Obstet Gynecol* 2011;205:317.e1-18.
10. van der Kooji, S. et al., Uterine artery embolization versus surgery in the treatment of symptomatic fibroids: a systematic review and meta analysis. *Am J Obstet Gynecol* 2011;205:317.e1-18.
11. Hehenkamp, W. et al., Uterine artery embolization versus hysterectomy in the treatment of symptomatic uterine fibroids (EMMY trial): Peri- and postprocedural results from a randomized controlled trial. *Am J Obstet Gynecol* 2005;193:1618-29.
12. van der Kooji, S. et al., Uterine artery embolization versus surgery in the treatment of symptomatic fibroids: a systematic review and meta analysis. *Am J Obstet Gynecol* 2011;205:317.e1-18.
13. Edwards, D. et al., Uterine-Artery embolization versus surgery for symptomatic uterine fibroids. *N Engl J Med* 2007; 356;360-70.
14. van der Kooji, S. et al., Uterine artery embolization versus surgery in the treatment of symptomatic fibroids: a systematic review and meta analysis. *Am J Obstet Gynecol* 2011;205:317.e1-18.
15. Wirthington-Kirsch, R., et al. The fibroid registry for outcomes data (FIBROID) for uterine embolization. *Obstet Gynecol* 2005;106;52-59.
16. van der Kooji, S. et al., Uterine artery embolization versus surgery in the treatment of symptomatic fibroids: a systematic review and meta analysis. *Am J Obstet Gynecol* 2011;205:317.e1-18.
17. Edwards, D. et al., Uterine-artery embolization versus surgery for symptomatic uterine fibroids. *N Engl J Med* 2007; 356;360-70.
18. van der Kooji, S. et al., Uterine artery embolization versus surgery in the treatment of symptomatic fibroids: a systematic review and meta analysis. *Am J Obstet Gynecol* 2011;205:317.e1-18.
19. Edwards, D. et al., Uterine-artery embolization versus surgery for symptomatic uterine fibroids. *N Engl J Med* 2007; 356;360-70.
20. Moss, JG. et al., Randomised comparison of uterine artery embolisation (UAE) with surgical treatment in patients with symptomatic uterine fibroids (REST Trial): 5-year results. *BJOG* 2011;118: 936-44.
21. de Brujin AM., et al., Uterine artery embolization vs hysterectomy in the treatment of symptomatic uterine fibroids: 10-year outcomes from the randomized EMMY trial. *Am J Obstet Gynecol* 2016;215;745.e1-12.
22. van der Kooji, S. et al., Uterine artery embolization versus surgery in the treatment of symptomatic fibroids: a systematic review and meta analysis. *Am J Obstet Gynecol* 2011;205:317.e1-18.
23. Hartmann KE, et al., prospective cohort study of uterine fibroids and miscarriage risk. *Am J Epidemiol* 2017;1-9.
24. McLucas, B., Pregnancy following uterine artery embolization: An update. *Minimally Invasive Therapy* 2013; 22:39-44
25. Mohan, P., et al., Uterine artery embolization and its effect on fertility. *J Vasc Surg* 2013;24-925-30.
26. Kovacsik, HN. Et al., Evaluation of changes in sexual function related to uterine fibroid embolization (UFE): results of the efuzen study. *Cardiovasc Intervent Radiol* 2017. Online.
27. Moorman, P. G., et al. Effect of hysterectomy with ovarian preservation on ovarian function. *Obstet Gynecol* 2011;118(6):1271-1279.
28. Subramanian, S., Spies, JB., Uterine artery embolization for leiomyomata: resource use and cost estimation.
29. Mara, Michal, et al. Midterm Clinical and First Reproductive Results of a Randomized Controlled Trial Comparing Uterine Fibroid Embolization and Myomectomy. *Cardiovasc Intervent Radiol* 2007; 31(1):73-85.
30. de Brujin AM., et al., Uterine artery embolization vs hysterectomy in the treatment of symptomatic uterine fibroids: 10-year outcomes from the randomized EMMY trial. *Am J Obstet Gynecol* 2016;215;745.e1-12.
31. Wirthington-Kirsch, R., et al. the fibroid registry for outcomes data (FIBROID) for uterine embolization. *Obstet Gynecol* 2005;106;52-59.
32. Moss, JG. et al., Randomised comparison of uterine artery embolisation (UAE) with surgical treatment in patients with symptomatic uterine fibroids (REST Trial): 5-year results. *BJOG* 2011;118:936-44.
33. van der Kooji, S. et al., Uterine artery embolization vs hysterectomy in the treatment of symptomatic uterine fibroids: 5-year outcome from the randomized EMMY trial. *Am J Obstet Gynecol* 2010;293:105.e1-13.



**3975 Fair Ridge Drive | Suite 400 North
Fairfax, Virginia 22033
(703) 691-1805
Fax (703) 691-1855**