

Quality Improvement Toolkit



IVC Filter Removal Toolkit

What can you do to improve quality of care?

In general, a retrievable IVC filter should be removed once it is no longer needed, i.e., when a patient is able to be placed back on anticoagulation or when the risk of venous thromboembolism has passed.¹ In order to improve quality of care, it is important for interventional radiologists to be aware of and follow guidelines for filter placement, patient follow-up post placement, and retrieval.

One way to improve quality of care for filter patients is to place filters only when absolutely indicated. Once a filter is placed, a variety of approaches can be used to improve quality of care and provide better patient follow-up. If placed as an inpatient, providing specific information at time of discharge about the need for evaluation for potential filter removal can help to minimize the number of patients lost to follow-up.² Further, scheduling a clinic appointment prior to discharge can also help to ensure that a patient is followed appropriately. Alternatively, IR clinical staff can keep a list of retrievable filters placed by the IR team, can track them, contact patients for follow-up visits, and work to ensure that every filter is accounted for (either removed or documented why it should not be removed).³ This database can be updated regularly and monitored by IR clinic staff to maximize the chances that patients return to IR clinic to be evaluated for filter removal. Adding a dedicated IVC filter removal clinic can lead to higher retrieval rates and decreased rates of patients lost to follow-up.⁴

Outreach to other specialties is also important. Offering to give grand rounds or other educational lectures can demonstrate the value of IR while also working to ensure that members of other clinical teams understand the importance of IVC filter removal when the devices are no longer needed.⁵ In addition, working to educate referring physicians about the need for long-term follow-up and retrieval can increase compliance.⁶ Further, IRs should make sure that their consult notes and follow-up office visit notes are sent to the referring physicians to keep everyone informed while also maintaining a strong IR clinical presence.

Why is this topic important?

First and most importantly, patient safety. Patients are frequently lost to follow up given the circumstances in which most filters are placed. The majority of filters placed in the US are retrievable and should be retrieved at the earliest moment that IVC filtration is no longer indicated. The longer the filter dwell time, the more challenging retrieval becomes. Additionally, as filter dwell time increases the filter complication rate also increases, including, but not limited to, filter thrombosis, fracture, penetration, embolization, pain and bleeding,⁷

Secondly, there are extensive medical legal ramifications of IVC filter patients being lost to follow up. FDA released an initial communication in 2010⁸ stating that “implanting physicians and clinicians responsible for the ongoing care of patients with retrievable inferior vena cava (IVC) filters should consider removing the filters as soon as protection from pulmonary embolism is no longer needed.” In 2014 the FDA issued a safety communication⁹ regarding removal of retrievable filters. The report advised that the agency had received reports of adverse events and problems with retrievable IVC filters, including device migration, filter fracture, embolization (movement of the entire filter or fracture fragments to the heart or lungs), perforation of the IVC, and difficulty removing the device.⁹ Some of these events led to adverse clinical outcomes. These types of events may be related to how long the filter has been implanted.

What can you do to improve quality of care?

1. Improve patient clinic visits and follow-up to avoid potential long-term filter complications.¹⁰
2. Establish an IVC filter tracking system to better manage patients with implanted IVC filters.
3. Improve upon and emphasize patient education.
4. Maintain discussions with other specialty colleagues about the importance of IVC filter follow-up.

How do you get this done?

Potential interventions to improve the retrieval rate of potentially retrievable IVC filters include establishing a patient registry (e.g. VIRTEX), a dedicated IVC filter clinic with active surveillance of patients, patient education pre and post filter placement, multidisciplinary protocols to initiate patient surveillance, and post placement communication with patients and their physicians.

1. Dedicated patient information at the time of discharge
 - Information provided to the patient letting them know that an IVC Filter was placed during their hospitalization, reasons why filters are commonly placed (generic), and the importance of following up with their physician or in clinic to determine when the filter can/should be removed.
2. [Standardized Report Templates](#)
 - Build/utilize a specific IVC Filter template during every instance where an IVC filter is placed. Within the dictation template there should be a hard stop/parameter where the IR must indicate a binary filter plan (i.e. intended to be lifelong vs potentially retrievable) — if the filter is determined to be retrievable then a secondary prompt to indicate a dedicated clinic follow up timeline should be established (i.e. Clinic appointment in 4 - 6 weeks or alternatively once a patient is tolerating routine anticoagulation as determined by their physician).
 - Utilize multidisciplinary team approach to encourage patient follow-up.¹¹ Allow medical assistants, techs, or other ancillary staff to routinely search for and follow-up with patients about coming in for their filter follow-up clinic visit.
 - If the patient is unable to be reached or declines to follow-up, a 3 certified-letter system (similar to that utilized in Mammography) to demonstrate considerable effort was made to contact the patient(s) and remove the filter.

What tools can you utilize?

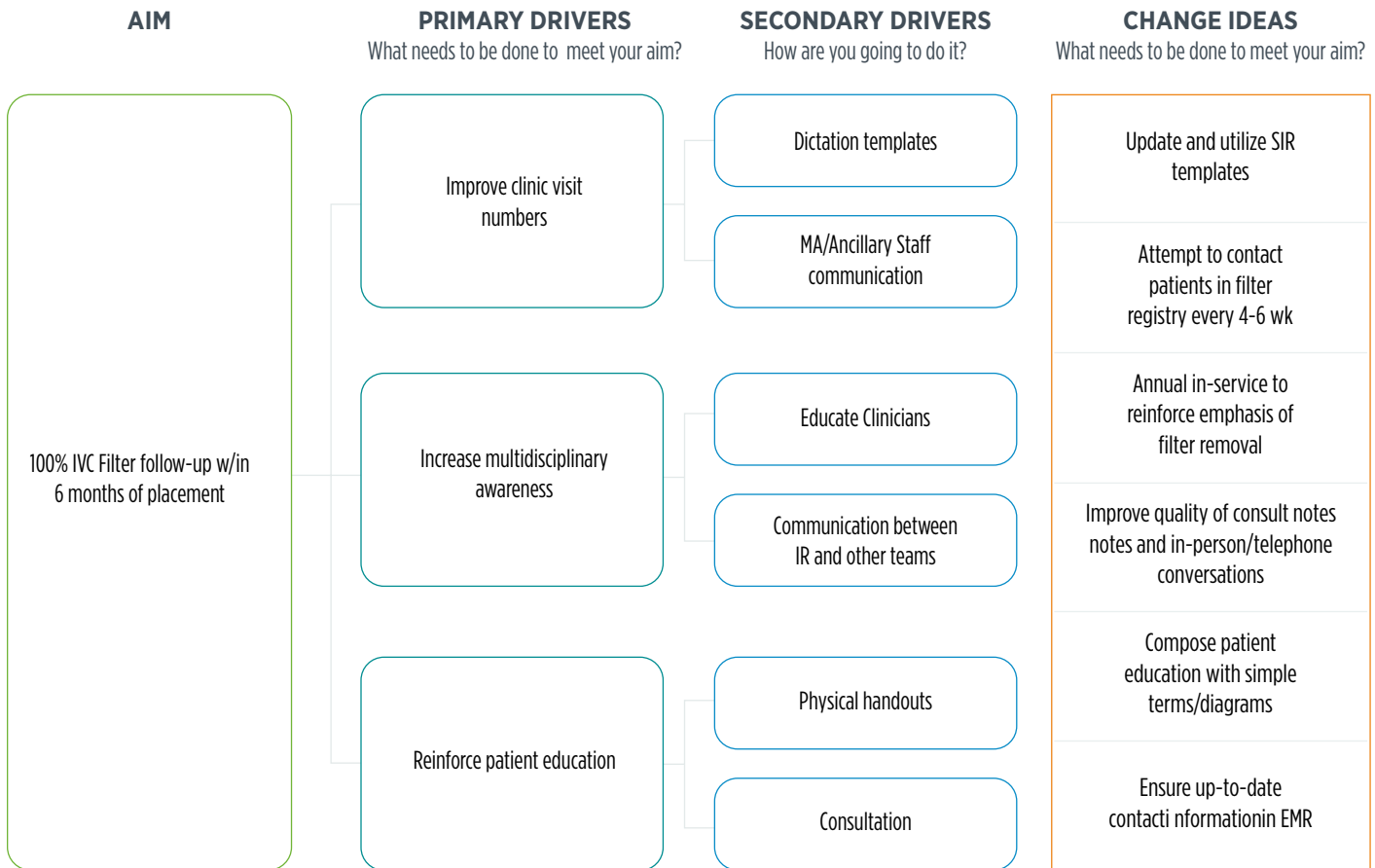
Several quality improvement tools can be implemented to help achieve filter retrieval goals including:

- Plan-Do-Study-Act (PDSA)
- Driver diagrams
- Cause and effect diagrams (i.e. fishbone diagram)

How do you know it is working?

Analysis will include the pre-intervention filter follow-up percentage compared to the post intervention follow-up over a set period of time. **The goal follow-up is 100%** (retrieving the filter, further filter surveillance as it is still indicated, or declaring the filter permanent).

Example IVC Filter Driver Diagram



Example IVC Filter PDSA Cycle

What are we trying to accomplish? (Aims statement)

- To improve follow-up, removal, and knowledge of patients with IVC filter placement. This will be achieved by: Improving clinic visit numbers (primary driver A in the driver diagram).
- How do we know if the change is an improvement?
- Measure outcomes of patient follow-up and IVC filter removal rates and compare with historical rates (varied by institution).
- What changes can we make that will result in improvement?
- There are several options for improving the number of clinic visit follow-ups for patients with IVC filters. These include:
- Utilizing updated SIR dictation templates.
- Maintaining communication with IVC filter patients.
- Automatically scheduling patients for clinic follow up visits following filter placement
- Establishing and reinforcing a knowledge base among patients and clinicians regarding IVC filters.

PDSA Cycle:

Plan (define the objectives, questions, and predictions)

- IVC filter follow-up rates have been reported to be low ranging from 30-55%.^{10,12} Retrieval rates have been reported at a mean of 34%¹³. The problem with the current system is that there is no established plan in place to ensure patients who have existing IVC filters or who undergo IVC filter placement are adequately followed up and have their filters removed.
- Our plan is to establish and institute a systematic process that improves IVC filter follow-up rates to 100% within 6 months of filter placement. In order to achieve this endpoint we need to ensure:
- IR's are aware of the standardized SIR IVC filter templates and utilize them to begin the dedicated process/procedure to maximize IVC filter follow-up.
- Medical assistants and/or ancillary staff is maintaining good communication with patients after IVC filter placement to emphasize the importance of follow-up
- Patients are counseled appropriately at time of discharge and given educational resources (in discharge paperwork along with clinic visit) to facilitate their understanding of IVC filter removal.

Do (carry out the plan, collect the data, begin analysis of the data)

Implement the plan and keep track of patient data utilizing IVC Filter Registry.

Data points:

- Hospital (City, State)
- DOB
- Name
- Contact information #/#'s
- MRN
- [SIR standardized template used?](#) (Y/N)
- Date of filter placement
- Filter type (brand)
- Location of filter placement (anatomic)
- Anatomic complication/tilt?
- Lifelong/intent to retrieve?
- Retrieved? (Y/N)
- Follow-up (specifically mentioned in dictation)
- Clinic follow-up result (Scheduled for retrieval/lifelong/pending further evaluation)
- Scheduled removal date
- Notes
- Collect data and begin analysis of trends and try to identify major issues with patient follow-up.

Study (Describe what actually happened when you ran the test; Describe the measured results and how they compared to the prediction and what you learned from the cycle)

- Tabulate the data from the IVC Filter Registry
- Analyze trends and/or specific instances where breakdown(s) may have occurred.
- Utilization of SIR standardized report templates
- Education of the patients pre/post procedure
- Dissemination of information to consulting physicians.
- Specifically mentioning the planned follow up (clinic visit in 4 weeks)
- E.g. We have noticed that 80% of patients that missed their first follow-up clinic appointment were also among the patients who did not have a standardized SIR IVC Filter template utilized in their procedural dictation.
- E.g. All of the IVC filters placed in Q1 of 2021 and dictated without a follow-up specifically mentioned in the dictation also failed to follow-up in clinic.
- E.g. All IVC filters ordered from the critical care service at “XXXX medical center” had appropriate follow-up and a scheduled removal date at the 3-month interval follow-up.
- E.g. We have noted a 75% increase of filter follow-up patients within 6 months of IVC filter placement when compared to data from 2015-2018.
- E.g. The data demonstrates 100% of the filters placed with “follow-up” specifically mentioned in the dictation also followed-up at their first clinic visit.

Act (Describe modifications for the next cycle based on what you learned)

- Utilize information gained from the study portion of the PDSA to analyze current strategies and implement modifications to the current plan(s) or update the plan all together based on the deficient areas leading to lack of patient follow-up, and ultimate filter removal.
- Discuss trends and assess improvement of patient and clinic follow-up compared to the historical data.

References

1. DeYoung E, Minocha J. Inferior vena cava filters: Guidelines, best practice, and expanding indications. *Semin Intervent Radiol*. 2016;33(2):65-70.
2. Parsons B, Polewski PJ, Smith AL, Borgert AJ, Azene E, Ziegelbein K, Fisher M, Horstman A, Brozak S, Escher PJ. Does timing of inferior vena cava filter retrieval planning impact retrieval rates? A comparison of planning before or after hospital discharge. *WMJ*. 2019;118(1):30-34. PMID 31083831.
3. Karp JK, Desai KR, Salem R, Ryu RK, Lewandowski RJ. A dedicated inferior vena cava filter service line: How to optimize your practice. *Semin Intervent Radiol*. 2016;33(2):105-108.
4. Salei A, Raborn J, Manapragada PP, Stoneburner CG, Aal AKA, Gunn AJ. Effect of a dedicated inferior vena cava filter retrieval program on retrieval rates and number of patients lost to follow-up. *Diagn Interv Radiol*. 2020;26(1):40-44.
5. Peress L, Kamil S, Fernandez M, Lastimoso R, Jaffer O, Patel S, Akhtar MR, Kyaw TJ. Improving the practice of inferior vena cava filter retrieval: A quality improvement intervention and audit outcomes. *Br J Radiol*. 2019;92(1100). PMID 31204842.
6. Klinken S, Humphries C, Ferguson J. Establishment of an inferior vena cava filter database and interventional radiology led follow-up – retrieval rates and patients lost to follow-up. *J Med imaging Radiat Oncol*. 2017;61(5):630-635. PMID 28419744.
7. Grewal S, Chamrathy MR, Kalva SP. Complications of inferior vena cava filters. *Cardiovasc Diagn Ther*. 2016;6(6):632-641. doi:10.21037/cdt.2016.09.08
8. Inferior Vena Cava (IVC) Filters: Initial Communication: Risk of Adverse Events with Long Term Use: FDA Initial Communication. <https://wayback.archive-it.org/7993/20170112165620/http://www.fda.gov/Safety/MedWatch/SafetyInformation/SafetyAlertsforHumanMedicalProducts/ucm221707.htm>
9. Removing Retrievable Inferior Vena Cava Filters: FDA Safety Communication. <http://wayback.archive-it.org/7993/20170722215731/https://www.fda.gov/MedicalDevices/Safety/AlertsandNotices/ucm396377.htm>
10. Lynch FC. A method for following patients with retrievable inferior vena cava filters: results and lessons learned from the first 1,100 patients. *J Vasc Interv Radiol*. 2011 Nov;22(11):1507-12. doi: 10.1016/j.jvir.2011.07.019. Epub 2011 Sep 8. PMID: 21903414.
11. Inagaki E, Farber A, Eslami MH, et al. Improving the retrieval rate of inferior vena cava filters with a multidisciplinary team approach. *J Vasc Surg Venous Lymphat Disord*. 2016;4(3):276-282.
12. Salei A, Raborn J, Manapragada PP, Stoneburner CG, Aal AKA, Gunn AJ. Effect of a dedicated inferior vena cava filter retrieval program on retrieval rates and number of patients lost to follow-up. *Diagn Interv Radiol*. 2020;26(1):40-44. doi:10.5152/dir.2019.18579
13. Angel LF, Tapson V, Galgon RE, Restrepo MI, Kaufman J. Systematic review of the use of retrievable inferior vena cava filters. *J Vasc Interv Radiol*. 2011 Nov;22(11):1522-1530.e3. doi: 10.1016/j.jvir.2011.08.024. PMID: 22024114.