Policy Statement

The use of steroid-eluting sinus stents for postoperative treatment following endoscopic sinus surgery and for treatment of recurrent sinonasal polyposis is considered **investigational**.

The use of drug-eluting sinus stents is considered **investigational** in all other conditions.

Policy Guidelines

Sinus stents are defined as implantable devices specifically designed to improve patency and/or deliver local medication. These devices are inserted under endoscopic guidance and are distinguished from sinus packing and variations on packing devices routinely employed after sinus surgery.

Foam dressings, such as Sinu-Foam™, are used as nasal packs for a variety of conditions, including nosebleeds, and have also been used after endoscopic sinus surgery (ESS). They are considered different types of nasal packing.

Middle meatal spacers are related but separate devices intended to maintain sinus patency post-endoscopic sinus surgery. They are splint-like devices inserted directly rather than under endoscopic guidance, and do not have the capability of delivering local medication.

**Coding**

Category III codes 0406T and 0407T were deleted effective 12/31/18. Per coding guidelines, effective 1/1/2019, to report endoscopic placement of a drug-eluting implant in the ethmoid sinus without any other nasal/sinus endoscopic surgical services, use CPT 31299. To report endoscopic placement of a drug-eluting implant in the ethmoid sinus in conjunction with biopsy, polypectomy, or debridement, use CPT 31237.

There is a HCPCS code for the Propel device:
- S1090: Mometasone furoate sinus implant, 370 micrograms

Drug eluting stents might also be billed with the following HCPCS code:
- J3490: Unclassified drug

Facility billing for drug eluting stents might use the following HCPCS codes:
- C2625: Stent, noncoronary, temporary, with delivery system
- C1874: Stent, coated/covered, with delivery system

Description

Steroid-eluting sinus stents are devices used postoperatively following endoscopic sinus surgery (ESS) or for treatment of recurrent sinonasal polyposis following ESS. These devices maintain patency of the sinus openings in the postoperative period, and/or serve as a local drug delivery vehicle. Reducing postoperative inflammation and maintaining patency of the sinuses may be important in achieving optimal sinus drainage and may impact recovery from surgery and/or reduce the need for additional surgery.
Steroid-Eluting Sinus Stents

Related Policies

- Balloon Ostial Dilation for Treatment of Chronic Rhinosinusitis

Benefit Application

Benefit determinations should be based on the applicable contract language. To the extent there are any conflicts between these guidelines and the contract language, the contract language will control. Please refer to the member's contract benefits in effect at the time of service to determine coverage or non-coverage of these services as it applies to an individual member.

Some state or federal mandates (e.g., Federal Employee Program [FEP]) prohibits plans from denying Food and Drug Administration (FDA)-approved technologies as investigational. In these instances, plans may have to consider the coverage eligibility of FDA-approved technologies on the basis of medical necessity alone.

Regulatory Status

Intraoperative Steroid-Eluting Sinus Stents

In 2011, the PROPEL(R) system (Intersect ENT, Menlo Park, CA) was approved by the U.S. Food and Drug Administration (FDA) through the premarket approval process (P100044). This device is a self-expanding, bioabsorbable, steroid-eluting stent intended for use in the ethmoid sinus. It is placed via endoscopic guidance using a plunger included with the device. Steroids (mometasone furoate) are released over an approximate duration of 30 days. The device dissolves over several weeks, and therefore does not require removal. In 2012, a smaller version of the PROPEL(R) device, the PROPEL(R) mini Sinus Implant, was approved for use in patients older than age 18 years following ethmoid sinus surgery. In 2017, the PROPEL Contour was approved through a PMA supplement. The PROPEL(R) Contour Sinus Implant is an adaptable implant that is designed to maximize drug delivery to the frontal and maxillary sinus.

Postoperative Steroid-Eluting Sinus Stents

SINUVA(TM) Sinus Implant (Intersect ENT, Inc., Menlo Park, CA) was initially approved in 1987. In 2017, the SINUVA(TM) Sinus Implant was approved with a new dose (1350 μg mometasone furoate) under a New Drug Application (NDA 209310). The corticosteroid is released over 90 days and the bioabsorbable polymers soften over this time. The implant is removed at Day 90 or earlier using standard surgical instruments. The SINUVA(TM) Sinus Implant is indicated for the treatment of nasal polyps in adult patients who have had ethmoid sinus surgery.

FDA product code: OWO

Rationale

Background
Chronic Rhinosinusitis

Chronic rhinosinusitis is an inflammatory sinus condition that has a prevalence between 1% and 5% in the U.S. population.¹

Treatment

Endoscopic sinus surgery (ESS) is typically performed on patients with chronic rhinosinusitis unresponsive to conservative treatment. The surgery is associated with high rates of improvement in up to 90% of more appropriately selected patients. However, there are no high-quality randomized controlled trials comparing functional ESS with continued medical management or alternative treatment approaches. Because of the high success rates and
minimally invasive approach, these procedures have rapidly increased in frequency, with an estimated 250,000 procedures performed annually in the United States. They can be done either in the physician’s office under local anesthesia or in the hospital setting under general anesthesia.

ESS involves the removal of small pieces of bone, polyps, and débridement of tissue within sinus cavities. There are a number of variations on the specific approach, depending on the disorders being treated and the preferences of the treating surgeon. For all procedures, there is substantial postoperative inflammation and swelling, and postoperative care is therefore a crucial component of ESS.

There are a number of postoperative treatment regimens, and the optimal regimen is uncertain. Options include saline irrigation, nasal packs, topical steroids, systemic steroids, topical decongestants, oral antibiotics, and/or sinus cavity débridement. Several randomized controlled trials have evaluated treatment options, but not all strategies have been rigorously evaluated. A 2011 systematic review has evaluated the evidence for these therapies. Reviewers concluded that the evidence was not strong for any of these treatments but that some clinical trial evidence supported improvements in outcomes. The strongest evidence supported use of nasal saline irrigation, topical nasal steroid spray, and sinus cavity débridement.

Some form of sinus packing is generally performed postoperatively. Simple dressings moistened with saline can be inserted manually following surgery. Foam dressings are polysaccharide substances that form a gel when hydrated and can be used as nasal packs for a variety of indications. Middle meatal spacers are splint-like devices that prop open the sinus cavities post-ESS but are not designed for drug delivery. There is some randomized controlled trial evidence that middle meatal spacers may reduce the formation of synechiae following ESS, although the available studies have significant heterogeneity in this outcome.

Implantable Sinus Stents
Implantable sinus stents are another option for postoperative management following ESS. These implants are intended to stabilize the sinus openings and the turbinates, reduce edema, and/or prevent obstruction by adhesions. They can also be infused with medication delivered topically over an extended period of time, and this local delivery of medications may be superior to topical application in the postoperative setting.

Literature Review
Evidence reviews assess the clinical evidence to determine whether the use of a technology improves the net health outcome. Broadly defined, health outcomes are length of life, quality of life, and ability to function—including benefits and harms. Every clinical condition has specific outcomes that are important to patients and to managing the course of that condition. Validated outcome measures are necessary to ascertain whether a condition improves or worsens; and whether the magnitude of that change is clinically significant. The net health outcome is a balance of benefits and harms.

To assess whether the evidence is sufficient to draw conclusions about the net health outcome of a technology, 2 domains are examined: the relevance and the quality and credibility. To be relevant, studies must represent one or more intended clinical use of the technology in the intended population and compare an effective and appropriate alternative at a comparable intensity. For some conditions, the alternative will be supportive care or surveillance. The quality and credibility of the evidence depend on study design and conduct, minimizing bias and confounding that can generate incorrect findings. The randomized controlled trial (RCT) is preferred to assess efficacy; however, in some circumstances, nonrandomized studies may be adequate. RCTs are rarely large enough or long enough to capture less common adverse events and long-term effects. Other types of studies can be used for these purposes and to assess generalizability to broader clinical populations and settings of clinical practice.
RCTs are important in the evaluation of sinus implants as an adjunct to endoscopic sinus surgery (ESS) to adequately compare implantable stents with alternative treatment regimens and to minimize the effects of confounders on outcomes. Case series and trials without control groups offer little in the way of relevant evidence, because improvement in symptoms is expected after ESS and because there are multiple clinical and treatment variables that may confound outcomes.

Steroid-Eluting Stents as an Adjunct to ESS

Clinical Context and Therapy Purpose

The purpose of a steroid-eluting sinus stent in patients who have chronic rhinosinusitis who have endoscopic sinus surgery is to provide a treatment option that is an alternative to or an improvement on existing therapies.

The question addressed in this evidence review is: does the adjunctive use of a steroid-eluting sinus stent improve the net health outcome in patients who have endoscopic sinus surgery?

The following PICOTS were used to select literature to inform this review.

Patients

The relevant population(s) of interest are patients who have endoscopic sinus surgery for chronic rhinosinusitis.

Interventions

The therapy being considered is a bioabsorbable steroid-eluting sinus stent (e.g., PROPEL Sinus Stent, PROPEL mini Sinus Stent, PROPEL Contour Sinus Stent) for post-operative care following ESS.

Comparators

The most relevant comparison for sinus stents is unclear because there is no standardized optimal postoperative treatment regimen. Ideally, the “standard care” comparison group should include some form of packing, intranasal steroids, and irrigation. An important consideration in evaluating controlled trials is that the control arm may not be treated with optimal intensity, thereby leading to a bias in favor of the device. For example, a study design that compares a steroid-eluting stent with a non-steroid-eluting stent will primarily evaluate the efficacy of steroids when delivered by the device but will not evaluate the efficacy of the stent itself. If the control group does not receive topical or oral steroids postoperatively, then this might constitute undertreatment in the control group and result in a bias favoring the treatment group. Another concern is comparison of the efficacy of a drug with the efficacy of a drug delivery system. For example, if a steroid-eluting spacer is compared with a control of saline irrigation alone, it will be difficult to separate the efficacy of the drug itself (steroids) from the drug delivery system (stent).

Outcomes

The Perioperative Sinus Endoscopy score sums the combined scores determined from middle turbinate position, middle meatal status, ethmoid cavity appearance, as well as secondary sinus blockage (frontal and sphenoid). Each category is scored from 0-2, with 0 being not present, 1 as partially present, and 2 being fully present. The highest total score is 16, with scores ranging from 18-20 when the frontal and sphenoid sinuses are also included. The higher the score, the worse the status of the nasal cavity.

Post-ESS synechiae formation, the Sino-Nasal Outcome Test (SNOT-22) Questionnaire and the Rhinosinusitis Disability Index may also be used to evaluate perioperative outcomes.

A beneficial outcome would be an improvement in symptoms.

A harmful outcome would be adverse events from the implantable stents.
**Timing**
The PROPEL series of sinus stents are bioabsorbable and elute steroids for 30 days. Therefore, outcomes should be assessed within 30 days.

**Setting**
The setting is treatment by an otolaryngologist in a surgical center.

**Review of Evidence**
The literature consists of randomized trials, single-arm case series, and systematic reviews of these studies. The following is a summary of the key findings to date.

**Systematic Reviews**
A 2015 Cochrane review addressed steroid-eluting sinus stents for improving chronic rhinosinusitis (CRS) symptoms in individuals undergoing ESS. Study eligibility criteria were RCTs that compared the effects of steroid-eluting sinus stents with non-steroid-eluting sinus stents, nasal packing, or no treatment in adults with CRS who underwent ESS. After an initial search, 21 RCTs were identified, including the RCTs reported by Murr et al (2011) and Marple et al (2012) (described above). None of the trials met authors' inclusion criteria. Reviewers concluded that there was no evidence from high-quality RCTs to demonstrate the benefits of steroid-eluting stents.

**Randomized Controlled Trials**
RCTs are shown in Tables 1 and 2. There are 4 RCTs of the PROPEL, PROPEL mini, and PROPEL Contour steroid-eluting sinus stents, all sponsored by the device manufacturer (Intersect ENT). These trials used an intrapatient control design, with each patient receiving a drug-eluting stent on one side and a non-drug-eluting stent or medical treatment on the other via random assignment.

The two trials of PROPEL for the ethmoid sinus had similar designs. Both compared an implant that is steroid-eluting with an identical non-steroid-eluting implant. Thus, these trials tested the value of drug delivery via a stent but did not test the value of a stent itself vs treatment without a stent. The primary efficacy outcome in Murr et al was degree of inflammation rated by the treating physician. In Marple et al the primary outcome was the need for postoperative interventions at day 30 postprocedure. A panel of 3 independent experts, blinded to treatment assignment and clinical information, viewed the endoscopic results and determined whether an intervention was indicated. The need for postoperative intervention by expert judgment was found in 33.3% of patients in the steroid-eluting arm and in 46.9% in the non-steroid-eluting arm (p=0.028). The reduction in interventions was primarily driven by a 52% reduction in lysis of adhesions (p=0.005). The primary safety hypothesis was met, because there were no cases of clinically significant increases in ocular pressure recorded over the 90-day period postprocedure.

The RCTs by Smith et al (2016) and Luong et al (2017), implanted either a PROPEL Mini Sinus Implant or a PROPEL Contour Sinus Implant in the frontal sinus with a control of surgery alone on the contralateral side. The primary outcome was the need for post-operative intervention (e.g., surgery or steroids) determined by an independent blinded physician. Both trials showed a reduction in the need for additional surgical intervention by approximately 22%, with no adverse effects of treatment. The number needed to treat was 4.7 to prevent 1 patient from undergoing postoperative intervention. No stent-related adverse events were noted.

**Table 1. Summary of Key RCT Characteristics**

<table>
<thead>
<tr>
<th>Study; Trial</th>
<th>Countries</th>
<th>Sites</th>
<th>Dates</th>
<th>Participants</th>
<th>Interventions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Murr et al (2011)</td>
<td></td>
<td></td>
<td></td>
<td>38 patients with refractory CRS</td>
<td>Unilateral PROPEL steroid-eluting stent in the side Non-drug-eluting stent on the other contralateral side</td>
</tr>
<tr>
<td>Study; Trial</td>
<td>Countries</td>
<td>Sites</td>
<td>Dates</td>
<td>Participants</td>
<td>Interventions</td>
</tr>
<tr>
<td>-------------</td>
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</tr>
<tr>
<td>Marple et al (2012)(^{11}) (ADVANCE II)</td>
<td>105 patients with refractory CRS</td>
<td>Unilateral PROPEL steroid-eluting stent in the ethmoid sinus</td>
<td>Non-drug-eluting stent on the contralateral side</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Smith et al (2016)(^{12}), US</td>
<td>80 patients with CRS who were scheduled to undergo primary or revision bilateral frontal sinusotomy</td>
<td>Unilateral PROPEL Mini Sinus Implant in the frontal sinus</td>
<td>Surgery alone on the contralateral side</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Luong et al (2017)(^{13}), US</td>
<td>80 patients with CRS who were scheduled to undergo primary or revision bilateral frontal sinusotomy</td>
<td>Unilateral PROPEL Contour Sinus Implant in the frontal sinus</td>
<td>Surgery alone on the contralateral side</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

CRS: chronic rhinosinusitis; RCT: randomized controlled trial.

### Table 2. Summary of Key RCT Results

<table>
<thead>
<tr>
<th>Study</th>
<th>Primary Outcome Measure</th>
<th>Polypoid Changes</th>
<th>Adhesions/scarring</th>
<th>Implant-Related Adverse Events</th>
</tr>
</thead>
<tbody>
<tr>
<td>Murr et al (2011)(^{10}), N</td>
<td>Degree of Inflammation at 21 Days Post-Procedure (100 mm VAS)</td>
<td>37</td>
<td>37</td>
<td>18.4%</td>
</tr>
<tr>
<td>PROPEL steroid-eluting Stent</td>
<td></td>
<td></td>
<td></td>
<td>Diff</td>
</tr>
<tr>
<td>Non-steroid-eluting stent</td>
<td>36.8%</td>
<td>21.1%</td>
<td>18 points</td>
<td>NR</td>
</tr>
<tr>
<td>Marple et al (2012)(^{11}), N</td>
<td>Need for Post-Operative Intervention Determined by 3 Independent Reviewers</td>
<td>91</td>
<td>PROPEL steroid-eluting Stent</td>
<td>33.3%</td>
</tr>
</tbody>
</table>
### Study Primary Outcome Measure Polypoid Changes Adhesions/scaring Implant-Related Adverse Events

<table>
<thead>
<tr>
<th>Study</th>
<th>Diff</th>
<th>p-value</th>
<th>Smith et al (2016)²</th>
<th>Need for Post-Operative Intervention at 30 Days (Independent Reviewer) n (%)</th>
<th>Need for Post-Operative Intervention at 90 Days</th>
<th>Occlusion/Restenosis Rate at Day 30</th>
</tr>
</thead>
<tbody>
<tr>
<td>PROPEL mini-sinus steroid-eluting stent</td>
<td>13.6%</td>
<td>0.028</td>
<td>26 (38.8%)</td>
<td>16 (21.1%)</td>
<td>none</td>
<td></td>
</tr>
<tr>
<td>SOC without a stent</td>
<td></td>
<td></td>
<td>42 (62.7%)</td>
<td>35 (46.1%)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Nu</td>
<td></td>
<td></td>
<td>67 (adequate video for independent review)</td>
<td>79</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Study</th>
<th>Need for Post-Operative Intervention at 30 Days (Independent Reviewer) n (%)</th>
<th>Need for Surgical Intervention at 30 Days (Independent Reviewer) n (%)</th>
<th>Occlusion/Restenosis Rate at Day 90</th>
</tr>
</thead>
<tbody>
<tr>
<td>PROPEL Contour steroid-eluting stent</td>
<td>7 (11.5)</td>
<td>4 (6.9)</td>
<td>16 (23.2)</td>
</tr>
<tr>
<td>SOC without a stent</td>
<td>20 (32.8)</td>
<td>15 (25.9)</td>
<td>28 (40.6)</td>
</tr>
<tr>
<td>Diff (95% Cl)</td>
<td>21.3% (35.1% to 7.6%)</td>
<td>19.0% (32.8% to 5.1%)</td>
<td>−17.4% (−28.6% to −6.1%)</td>
</tr>
<tr>
<td>NNT</td>
<td>4.7</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Summary

Range 13.6% to 23.9%

CI: confidence interval; HR: hazard ratio; NNT: number needed to treat; NR: not reported; RCT: randomized controlled trial; SOC: standard of care.

Gaps in relevance and in design and conduct are shown in Tables 3 and 4. The primary gap for the Studies by Murr et al (2011) and Marple et al (2012) on the PROPEL implant in the ethmoid sinus was whether the comparator had received the optimal treatment in terms of packing, intranasal steroids, and irrigation. For the studies by Smith et al (2016) and Luong et al (2017), there was a high percentage of patients who were not able to be evaluated due to video quality.

### Table 3. Relevance Gaps

<table>
<thead>
<tr>
<th>Study</th>
<th>Population</th>
<th>Intervention</th>
<th>Comparator</th>
<th>Outcomes</th>
<th>Follow-Up</th>
</tr>
</thead>
<tbody>
<tr>
<td>Murr et al (2011)¹⁰</td>
<td>3. The comparator may not have received the optimal treatment (some form of packing, intranasal steroids, and irrigation)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
### Study Population\(^a\) Intervention\(^b\) Comparator\(^c\) Outcomes\(^d\) Follow-Up\(^e\)

<table>
<thead>
<tr>
<th>Study</th>
<th>Population(^a)</th>
<th>Intervention(^b)</th>
<th>Comparator(^c)</th>
<th>Outcomes(^d)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Marple et al (2012)(^11)</td>
<td></td>
<td>3. The comparator may not have received the optimal treatment (some form of packing, intranasal steroids, and irrigation)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Smith et al (2016)(^12)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Luong et al (2017)(^13)</td>
<td></td>
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</tbody>
</table>

The evidence gaps stated in this table are those notable in the current review; this is not a comprehensive gaps assessment.

\(^a\) Population key: 1. Intended use population unclear; 2. Clinical context is unclear; 3. Study population is unclear; 4. Study population not representative of intended use.

\(^b\) Intervention key: 1. Not clearly defined; 2. Version used unclear; 3. Delivery not similar intensity as comparator; 4. the intervention of interest.

\(^c\) Comparator key: 1. Not clearly defined; 2. Not standard or optimal; 3. Delivery not similar intensity as intervention; 4. Not delivered effectively.

\(^d\) Outcomes key: 1. Key health outcomes not addressed; 2. Physiologic measures, not validated surrogates; 3. No CONSORT reporting of harms; 4. Not establish and validated measurements; 5. Clinical significant difference not prespecified; 6. Clinical significant difference not supported.

\(^e\) Follow-Up key: 1. Not sufficient duration for benefit; 2. Not sufficient duration for harms.

### Table 4: Study Design and Conduct Gaps

<table>
<thead>
<tr>
<th>Study</th>
<th>Allocation(^a)</th>
<th>Blinding(^b)</th>
<th>Selective Reporting(^c)</th>
<th>Data Completeness(^d)</th>
<th>Power(^e)</th>
<th>Statistical(^f)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Murr et al (2011)(^10)</td>
<td></td>
<td>3. Outcome assessed by treating physician</td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Marple et al (2012)(^11)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Smith et al (2016)(^12)</td>
<td></td>
<td>2. Incomplete reporting of secondary outcomes</td>
<td>1. 12 (17%) patients did not have independent review at 30 days due to suboptimal video quality.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Luong et al (2017)</td>
<td></td>
<td></td>
<td></td>
<td>1. 19 (24%) patients did not have independent review at 30 days due to suboptimal video quality.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

The evidence gaps stated in this table are those notable in the current review; this is not a comprehensive gaps assessment.


\(^b\) Blinding key: 1. Not blinded to treatment assignment; 2. Not blinded outcome assessment; 3. Outcome assessed by treating physician.

\(^c\) Selective Reporting key: 1. Not registered; 2. Evidence of selective reporting; 3. Evidence of selective publication.

\(^d\) Data Completeness key: 1. High loss to follow-up or missing data; 2. Inadequate handling of missing data; 3. High number of crossovers; 4. Inadequate handling of crossovers; 5. Inappropriate exclusions; 6. Not intent to treat analysis (per protocol for noninferiority trials).

\(^e\) Power key: 1. Power calculations not reported; 2. Power not calculated for primary outcome; 3. Power not based on clinically important difference.
Nonrandomized Comparative Studies

The largest nonrandomized study identified was reported by Xu et al (2016).\textsuperscript{14} It evaluated post-ESS synechiae formation among 146 patients (252 nasal cavities) treated with a steroid-eluting absorbable spacer and 128 patients (233 nasal cavities) treated with a nonabsorbable spacer. Eligible patients included those who underwent ESS (at minimum, maxillary antrostomy and anterior ethmoidectomy) for CRS with or without nasal polyps and were treated with a sinus spacer. Rates of synechiae formation at 1 month postoperatively did not differ significantly between groups (5 [2.0%] nasal cavities in the absorbable stent group vs 13 [5.6%] nasal cavities in the nonabsorbable spacer group).

Section Summary: Steroid-Eluting Stents as an Adjunct to ESS

The most direct evidence relating to use of steroid-eluting nasal stents as an adjunct to ESS comes from 4 RCTs comparing steroid-eluting stents with either a non-steroid-eluting stent or medical management. The need for post-operative intervention at 30 days was reduced by 14% to 24% translating to a number needed to treat of 4.7 or more. Three trials used blinded assessors to evaluate post implantation sinus changes, an important strength, but the trials had potentials for bias. To most accurately evaluate the benefit from PROPEL devices it is important to ensure that the comparison group is not undertreated (i.e., receives some form of packing, intranasal steroids, and irrigation).

Steroid-Eluting Stents for Recurrent Polyposis

Clinical Context and Therapy Purpose

The purpose of steroid-eluting stents in patients who have recurrent polyposis is to provide a treatment option that is an alternative to or an improvement on existing therapies.

The question addressed in this evidence review is: does the use of steroid-eluting stents improve the net health outcome in patients with recurrent polyposis?

The following PICOTS were used to select literature to inform this review.

Patients

The relevant population of interest are patients with recurrent polyposis after ESS.

Interventions

The therapy being considered is steroid-eluting stent (e.g., SINUVA).

This stent is biodegradable and softens over time but needs to be removed by 90 days.

Comparators

A sham treatment may be used to determine whether active treatment reduces the need for ESS.

Outcomes

The general outcomes of interest are symptoms, anatomic outcomes, and need for additional ESS. These outcomes may be measured by the nasal obstruction/congestion score change (scale 0–3), polyp grade change (scale 0 to 8), ethmoid sinus obstruction change (scale 0–100), and the percentage of patients still indicated for repeat sinus surgery.

A beneficial outcome would be an improvement in symptoms and reduction in repeat ESS. A harmful outcome would be adverse events from the implantable stents.
Timing
The steroid-eluting stents are kept in place for up to 90 days. Relevant outcomes would be measured at 90 days to evaluate the short-term effects of the treatment and at one or two years to evaluate the durability of this treatment.

Setting
The setting is outpatient care by an otolaryngologist.

Review of Evidence
Two sham-controlled RCTs (RESOLVE and RESOLVE II) with a total of 400 patients have addressed outcomes after placement of steroid-eluting absorbable sinus stents in the office setting due to recurrent or persistent nasal polyposis after ESS (see Tables 5 and 6).\textsuperscript{15,16}

In RESOLVE, for endoscopically measured outcomes, at 90 days of follow-up, the treatment group had a greater reduction in polyp grade than the control group (-1.0 vs -0.1; \(p=0.016\)) and a greater reduction in percent ethmoid obstruction on a 100-mm VAS (-21.5 mm vs 13 mm; \(p=0.001\)), both respectively. For patient-reported outcomes, there were no significant differences in change in nasal obstruction/congestion scores between groups. In RESOLVE II, the implant group showed significant reductions in nasal congestion, polyp grade, and ethmoid obstruction at 90 days compared to sham controls. Out of 200 patients treated with the implant, 39\% were indicated for sinus surgery at 3 months compared to 63.3\% of controls (\(p<0.001\)).

<table>
<thead>
<tr>
<th>Study; Trial</th>
<th>Countries</th>
<th>Sites</th>
<th>Dates</th>
<th>Participants</th>
<th>Interventions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Han et al (2014)\textsuperscript{15}; RESOLVE</td>
<td>100 patients with recurrent nasal polyposis after ESS who had chronic rhinosinusitis, had undergone prior bilateral total ethmoidectomy more than 3 months earlier, had endoscopically confirmed recurrent bilateral ethmoid sinus obstruction due to polyposis that was refractory to medical therapy, and were considered candidates for repeat surgery based on the judgment of the surgeon and patient.</td>
<td>53 patients who received office-based placement of a mometasone-eluting nasal stent</td>
<td>47 patients who received sham treatment</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Kern et al (2018)\textsuperscript{16}; RESOLVE II</td>
<td>US</td>
<td>34</td>
<td>2014-2016</td>
<td>201 patients who received a SINUVA(TM) mometasone-eluting bioabsorbable nasal stent</td>
<td>99 patients who received sham treatment consisting of insertion and removal of implants</td>
</tr>
</tbody>
</table>
have moderate-to-severe symptoms of nasal obstruction/congestion; and (4) have endoscopic evidence of bilateral ethmoid sinus obstruction due to polyps.

ESS: endoscopic sinus surgery; RCT: randomized controlled trial.

Table 6. Summary of Key RCT Results

<table>
<thead>
<tr>
<th>Study</th>
<th>Nasal obstruction/congestion score change (scale 0-3)</th>
<th>Change in Polyp Grade at 90 Days (scale 0 to 8)</th>
<th>Reduction in Ethmoid Obstruction (scale 100) at 90 Days</th>
<th>Patients Indicated for Sinus Surgery at 3 months n (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Han et al (2014)15; RESOLVE</td>
<td>-1.0</td>
<td>-21.5 mm</td>
<td>-11.3 (18.1)</td>
<td>78/200 (39.0%)</td>
</tr>
<tr>
<td>Drug-eluting nasal stent</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sham</td>
<td>-0.1</td>
<td>1.3 mm</td>
<td></td>
<td>77%</td>
</tr>
<tr>
<td>P-value</td>
<td>0.016</td>
<td>0.001</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Kern et al (2018)16; RESOLVE II</td>
<td>-0.80 (0.73)</td>
<td>-0.56 (1.06)</td>
<td>-11.3 (18.1)</td>
<td>62/98 (63.3%)</td>
</tr>
<tr>
<td>Drug-eluting nasal stent mean (SD)</td>
<td>-0.80 (0.73)</td>
<td>-0.56 (1.06)</td>
<td>-11.3 (18.1)</td>
<td>78/200 (39.0%)</td>
</tr>
<tr>
<td>Sham mean (SD)</td>
<td>-0.56 (0.62)</td>
<td>-0.15 (0.91)</td>
<td>-1.9 (14.4)</td>
<td>62/98 (63.3%)</td>
</tr>
<tr>
<td>Diff or OR (95% CI)</td>
<td>-0.23 (-0.39 to -0.06)</td>
<td>-0.35 (-0.60 to -0.09)</td>
<td>-7.96 (-12.10 to -3.83)</td>
<td>2.69 (1.63 to 4.44)</td>
</tr>
<tr>
<td>P-value</td>
<td>0.007</td>
<td>0.007</td>
<td>&lt;0.001</td>
<td>&lt;0.001</td>
</tr>
</tbody>
</table>

CI: confidence interval; NR: not reported; OR: odds ratio; RCT: randomized controlled trial.

Gaps in relevance and design and conduct are shown in Tables 7 and 8. A major limitation of the trials was the short duration of follow-up to determine the durability of the treatment. In addition, there is a potential for bias since outcomes were evaluated by the treating physician.

Table 7. Relevance Gaps

<table>
<thead>
<tr>
<th>Study</th>
<th>Populationa</th>
<th>Interventionb</th>
<th>Comparatorc</th>
<th>Outcomesd</th>
<th>Follow-Upa</th>
</tr>
</thead>
<tbody>
<tr>
<td>Han et al (2014)15; RESOLVE</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>1. The 90 day follow-up is insufficient to evaluate the durability of this treatment.</td>
</tr>
<tr>
<td>Kern et al (2018)16; RESOLVE II</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>1. The 90 day follow-up is insufficient to evaluate the durability of this treatment.</td>
</tr>
</tbody>
</table>

The evidence gaps stated in this table are those notable in the current review; this is not a comprehensive gaps assessment.

a Population key: 1. Intended use population unclear; 2. Clinical context is unclear; 3. Study population is unclear; 4. Study population not representative of intended use.

b Intervention key: 1. Not clearly defined; 2. Version used unclear; 3. Delivery not similar intensity as comparator; 4. The intervention of interest.

c Comparator key: 1. Not clearly defined; 2. Not standard or optimal; 3. Delivery not similar intensity as intervention; 4. Not delivered effectively.

d Outcomes key: 1. Key health outcomes not addressed; 2. Physiologic measures, not validated surrogates; 3. No CONSORT reporting of harms; 4. Not establish and validated measurements; 5. Clinical significant difference not prespecified; 6. Clinical significant difference not supported.

e Follow-Up key: 1. Not sufficient duration for benefit; 2. Not sufficient duration for harms.
### Table 8. Study Design and Conduct Gaps

<table>
<thead>
<tr>
<th>Study</th>
<th>Allocation</th>
<th>Blinding</th>
<th>Selective Reporting</th>
<th>Data Completeness</th>
<th>Power</th>
<th>Statistical</th>
</tr>
</thead>
<tbody>
<tr>
<td>Han et al (2014) RESOLVE</td>
<td>3. Outcomes were assessed by the treating physician</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>3. Statistics were not reported for some outcome measures</td>
</tr>
<tr>
<td>Kern et al (2018) RESOLVE II</td>
<td>3. Polyp grade and sinus obstruction were assessed by the treating physician</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

The evidence gaps stated in this table are those notable in the current review; this is not a comprehensive gaps assessment.

- **Allocation key:** 1. Participants not randomly allocated; 2. Allocation not concealed; 3. Allocation concealment unclear; 4. Inadequate control for selection bias.
- **Blinding key:** 1. Not blinded to treatment assignment; 2. Not blinded outcome assessment; 3. Outcome assessed by treating physician.
- **Selective Reporting key:** 1. Not registered; 2. Evidence of selective reporting; 3. Evidence of selective publication.
- **Data Completeness key:** 1. High loss to follow-up or missing data; 2. Inadequate handling of missing data; 3. High number of crossovers; 4. Inadequate handling of crossovers; 5. Inappropriate exclusions; 6. Not intent to treat analysis (per protocol for noninferiority trials).
- **Power key:** 1. Power calculations not reported; 2. Power not calculated for primary outcome; 3. Power not based on clinically important difference.
- **Statistical key:** 1. Analysis is not appropriate for outcome type: (a) continuous; (b) binary; (c) time to event; 2. Analysis is not appropriate for multiple observations per patient; 3. Confidence intervals and/or p values not reported; 4. Comparative treatment effects not calculated.

### Section Summary: Steroid-Eluting Stents for Recurrent Polyposis

One RCT was identified evaluating the use of steroid-eluting nasal stents for recurrent or persistent nasal polyposis after ESS, which demonstrated improvements in polyp grade and ethmoid obstruction. Strengths of this trial included use of a sham control and adequate power for its primary outcome. However, the trial had a high risk of bias due to unblinded outcome assessment. Although avoidance of repeat ESS and oral steroids may be relevant outcomes for this indication, it would be more important if decisions about repeat ESS or other treatments were standardized and, in the trial setting, if decisions were prespecified or made by a clinician blinded to treatment group. Sinus stents may prove to have a role in nasal polyposis; however, additional positive results from well-designed RCTs are needed to confirm the results of the single available RCT.

### Summary of Evidence

For individuals who have chronic rhinosinusitis who have undergone ESS who receive implantable steroid-eluting sinus stents, the evidence includes RCTs. Relevant outcomes are symptoms, change in disease status, morbid events, and treatment-related morbidity. The most direct evidence relating to use of steroid-eluting nasal stents as an adjunct to ESS comes from 4 RCTs comparing steroid-eluting stents with either a non-steroid-eluting stent or medical management. The need for post-operative intervention at 30 days was reduced by 14% to 24%, translating to a number needed to treat of 4.7 or more. Three trials used blinded assessors to evaluate post implantation sinus changes, an important strength, but the trials had potentials for bias. To most accurately evaluate the benefit from PROPEL devices it is important to ensure that the comparison group is not undertreated (i.e., receives some form of packing, intranasal steroids, and irrigation). The evidence is insufficient to determine the effects of the technology on health outcomes.
For individuals who have recurrent sinonasal polyposis who have undergone endoscopic sinus surgery who receive implantable steroid-eluting sinus stents, the evidence includes RTCs. Relevant outcomes are symptoms, change in disease status, morbid events, and treatment-related morbidity. Two RCTs were identified evaluating the use of steroid-eluting nasal stents for recurrent or persistent nasal polyposis after ESS, which demonstrated improvements in polyp grade and ethmoid obstruction. Strengths of these trials included use of a sham control and adequate power for its primary outcome. However, the trials had a high risk of bias due to unblinded outcome assessment. Although avoidance of repeat ESS and oral steroids may be relevant outcomes for this indication, it would be more important if decisions about repeat ESS or other treatments were standardized and, in the trial setting, if decisions were prespecified or made by a clinician blinded to treatment group. Sinus stents may prove to have a role in nasal polyposis; however, further follow-up is needed to evaluate the durability of the results. The evidence is insufficient to determine the effects of the technology on health outcomes.

Supplemental Information
Clinical Input 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 from Blue Cross Blue Shield Association, input was received from 1 physician specialty society and 4 academic medical centers in 2012. Input overall was mixed, without consensus among respondents. Some reviewers expressed support for use of these devices after endoscopic sinus surgery. Reviewers who supported use cited the randomized controlled trials reviewed in this review as the main source of evidence. Other reviewers did not support use in general following endoscopic sinus surgery, arguing that a subset of patients may benefit, but there was no consensus on which populations this subgroup would include.

Practice Guidelines and Position Statements
No guidelines or statements were identified.

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

Medicare National Coverage
There is no national coverage determination. In the absence of a national coverage determination, coverage decisions are left to the discretion of local Medicare carriers.

Ongoing and Unpublished Clinical Trials
A search of clinicaltrials.gov in February, 2019 did not identify any trials that would likely influence this review.

References
12. Smith, TT, Singh, AA, Luong, AA, Ow, RR, Shotts, SS, Sautter, NN, Han, JJ, Stambaugh, JJ, Raman, AA. Randomized controlled trial of a bioabsorbable steroid-releasing implant in the frontal sinus opening. Laryngoscope, 2016 Jul 2;126(12). PMID 27363723

**Documentation for Clinical Review**

- No records required

**Coding**

This Policy relates only to the services or supplies described herein. Benefits may vary according to product design; therefore, contract language should be reviewed before applying the terms of the Policy. Inclusion or exclusion of codes does not constitute or imply member coverage or provider reimbursement.

**IE**

The following services may be considered investigational.
### Definitions of Decision Determinations

**Medically Necessary:** A treatment, procedure, or drug is medically necessary only when it has been established as safe and effective for the particular symptoms or diagnosis, is not investigational or experimental, is not being provided primarily for the convenience of the patient or the provider, and is provided at the most appropriate level to treat the condition.

**Investigational/Experimental:** A treatment, procedure, or drug is investigational when it has not been recognized as safe and effective for use in treating the particular condition in accordance with generally accepted professional medical standards. This includes services where approval by the federal or state governmental is required prior to use, but has not yet been granted.

**Split Evaluation:** Blue Shield of California/Blue Shield of California Life & Health Insurance Company (Blue Shield) policy review can result in a split evaluation, where a treatment, procedure, or drug will be considered to be investigational for certain indications or conditions.
but will be deemed safe and effective for other indications or conditions, and therefore potentially medically necessary in those instances.

**Prior Authorization Requirements (as applicable to your plan)**

Within five days before the actual date of service, the provider must confirm with Blue Shield that the member's health plan coverage is still in effect. Blue Shield reserves the right to revoke an authorization prior to services being rendered based on cancellation of the member's eligibility. Final determination of benefits will be made after review of the claim for limitations or exclusions.

Questions regarding the applicability of this policy should be directed to the Prior Authorization Department. Please call (800) 541-6652 or visit the provider portal at www.blueshieldca.com/provider.

Disclaimer: This medical policy is a guide in evaluating the medical necessity of a particular service or treatment. Blue Shield of California may consider published peer-reviewed scientific literature, national guidelines, and local standards of practice in developing its medical policy. Federal and state law, as well as contract language, including definitions and specific contract provisions/exclusions, take precedence over medical policy and must be considered first in determining covered services. Member contracts may differ in their benefits. Blue Shield reserves the right to review and update policies as appropriate.